the OIL AND GAS JOURNAL

PUBLISHED WEEKLY DECEMBER 26, 1960

WORLD WIDE OIL

p. 97

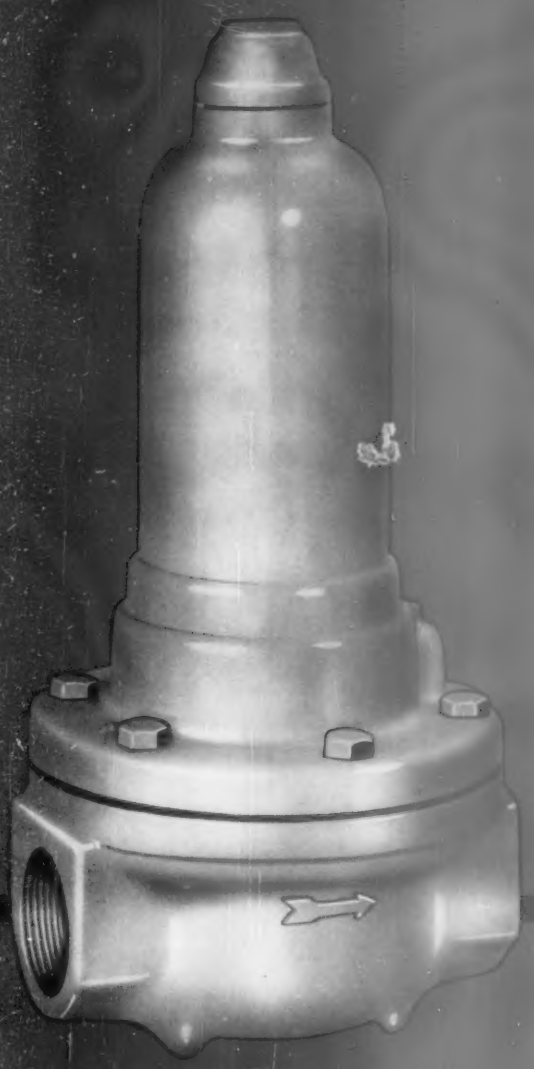
Top oil executives tell how they view

THE YEAR AHEAD

Some things they see:

A 2-2½% demand increase in U. S., 4-5% abroad; more government involvement in oil; bottoming out of recession in second quarter; continued world-wide surplus; continued austerity programs; a good profit year—if supply-demand balance is achieved; more competition from other energy sources; not too much competition from Russia.

These exclusive year-end forecasts begin on page 75.



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HIGHEST OUTLET PRESSURE { up to 600 psi (¾-1-1¼") / up to 400 psi (1½-2") }

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Sizes ¾" to 2" inclusive

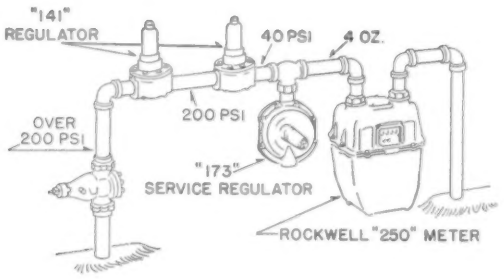
HOW TO CONTROL GAS AT 1000 psi . . . PLUS

This compact, sturdy "141" regulator offers the highest safety factor and utility in controlling gas at elevated pressures. It is service tested for 1000 psi at both inlet and outlet and designed to withstand shock loads of up to 1500 psi.

The convenience of interchangeable orifices and springs permits controlling outlet pressures within a 3 to 600 psi range. The same husky, large area diaphragm assembly is used for both low and high pressures. In any range, absolute zero lock up is obtained.

For installation security, the adjustment screw is guarded by a protective cap. With this construction you can even bury this regulator and pipe the vent above ground. Write for bulletin. Rockwell Manufacturing Co. Pittsburgh 8, Pa. In Canada: Rockwell Manufacturing Company of Canada, Ltd., Guelph, Ont.

HOW TO SERVE GAS TO FARM TAP CUSTOMERS



There are many opportunities to sell gas direct from high pressure lines. Farm tap service is one. Irrigation service is becoming equally important. The use of two "141" regulators for the primary cut provides a wide margin of safety while eliminating stress, valve abrasion and wire cutting.

HIGH PRESSURE REGULATORS

another fine product by

ROCKWELL

OIL AND GAS JOURNAL
Vol. 58, No. 52

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WORLD-WIDE OIL REPORT

Internationally minded oil men will find much meat in this 54-page package of world-wide petroleum facts and figures. Here, in easy-to-read form, are things you'll want to know about foreign operations. A brief text rounds up the basic facts for each oil nation, spotlighting trends and prospects. The text is then backed with detailed production and drilling figures.

Journal Survey 98

Leading off the world-wide report is a comprehensive table covering oil operations around the globe. Condensed here are total figures for refining, production, drilling, and reserves for each nation.

European Map 100

A special four-color map focuses attention on European oil, showing fields, pipelines, and refineries. The map covers not only Europe proper, but also the Near East, and northern Africa. A one-page key to refineries on the following page (102) lists 162 refineries in 12 nations, Scandinavia, the Middle East, and North Africa.

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By E. T. Guerrero and F. M. Stewart

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What the Oil Investor Wants to Know 161

By Addison L. Hayner

A six-part outline presents the essential elements of a good report to the prospective investor. These include a realistic and complete picture of what may happen, with a frank evaluation of the prospect's losing money or of producing little or no return on the invested money.

Liquid Sulfur Directly from Sour Gas 165

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Pipeline Construction Report 167

New projects and those under way, both foreign and U. S., in the construction of gas, crude, and products pipelines. A monthly Journal feature.

the OIL AND GAS JOURNAL Newsletter

Tulsa, Okla.
Dec. 26, 1960

General pattern for 1961 wage raises is shaping up:

A double-standard may emerge involving a 5% general pay hike or a 14-cent an hour hike.

OCAW agreement with Sinclair sets the pace.

Union took 14 cents an hour increase on a 1-year contract after originally asking 18 cents an hour.

This indicates what the big union in the industry will accept. OCAW earlier had turned down offers from others for a 5% raise on a 2-year contract and let it be known it favored a straight cents-per-hour raise on a 1-year basis to a percentage increase.

Most other majors, however, are sticking to the 5% offer but are agreeable to the 1-year contract (p. 88)*.

▼ ▼ ▼

Here's the statistical position of Free World oil:

Reserves—267.5 billion barrels.

Production—17,628,670 bbl. daily from 648,718 producing wells. On December 1, 3,965 wells were drilling of which 2,935 were in the United States.

Refining—604 plants with crude capacity of 22,100,100 bbl. daily (p. 97).

Total demand for petroleum products actually is greater than shown by Bureau of Mines figures—by about half a percentage point this year.

Reason: In the last 10 years, trend away from resid to lighter products permits refiners to make about 102 bbl. of products from 100 bbl. of crude.

Bureau of Mines uses a balanced system of computing demand. On one side is the input of basic materials including crude runs, gas-liquids production, and crude taken from storage. On the other is the demand for individual products computed on a disappearing basis.

Before 1950 demand for individual products totaled less than the supply used, due to losses in the refining process. So to make a balance the losses were entered on the demand side. Now however, to strike a balance "minus losses" are en-

*Refers to article in this issue giving more details. When no page is given, the item is a Newsletter exclusive.

tered on the demand side. They show a processing "bonus" for refiners but tend to understate total demand.

The strange statistical situation is being reviewed by API Committee on Petroleum Statistics which may suggest possible revisions.

▼ ▼ ▼

The man tapped by President-elect Kennedy to be chairman of the Council of Economic Advisers in the new administration is not rated a friend of oil.

In the past Dr. Walter Heller, head of the economics department at the University of Minnesota, has urged a lower percentage depletion for oil, gas and minerals. He also has advocated tighter tax treatment of development and drilling costs.

Heller has taken a cautious stand on liberalizing depreciation allowances for business. It's his belief any changes should be confined to areas of the economy that the Government wants stimulated.

▼ ▼ ▼

Two Texans plan three outpost wells to Pinta Dome field in Arizona in an attempt to extend the field's reserves of helium-rich natural gas (p. 195).

The helium percentage of Pinta gas is 8 or 9 compared with 2% average for Panhandle fields. Principal operators at Pinta until now have been Kerr-McGee, Eastern Petroleum, and Crest Oil.

The payoff for a helium strike is high. Pinta reserves so far are estimated at 15 billion gross cubic feet of gas with 1.2 billion of this helium which will sell for $40 per M.c.f. Well costs are low since the pay is found at from 780 to 1,200 ft.

First wildcat in Alaska is being planned by Pan American in the Napatuk Creek area of the Bethel-Kuskokwim district in western section of the state.

Well will be called 1 Napatuk Creek and it will be drilled by a rig capable of going to 15,000 ft. The rig and supplies are on the bank of the Kuskokwim near the mouth of the Johnson River and will be freighted in when the heavy freeze sets in. Spudding deadline is March 1.

Richfield has applied for a permit to complete a well off California on the ocean floor.

Method planned is the underwater-completion technique developed by Peruvian Pacific, a Richfield affiliate, which completed a well in 1,000 ft. of water. The California completion would be made in several hundred feet of water on the Rincon lease off Ventura County.

The lease provides a prime example of savings possible

with underwater completions. Richfield spent $4 million to build a 46-well drilling island on the lease. It will be unnecessary if underwater completions can be used.

Another advantage: Completions can be made from barges on drill ships without the need of a permanent platform. This should open up some areas where platforms are now forbidden.

▼ ▼ ▼

New twist on that Pemex-Western Natural Gas crude deal: Both are investigating possibilities of pipelining heavy Panuco crude from Mexico to Western's Premier Division asphalt plant at Brownsville, Tex.

Transportation by tanker would be cheaper. But a pipeline shipment over land would technically be exempt from imports controls.

Move to soften impact of higher income taxes reportedly is being considered by the Venezuelan Government.

The tax jump from 50 to 60% has backfired on the nation economically as well as cut company profits. The action is planned for a time following the current political turmoil and will be designed to have a stimulating influence on oil company operations.

▼ ▼ ▼

Agents of 50 natural-gas producing companies met quietly in Houston last week to talk over the impact on their industry of the area pricing concept of FPC.

Majors and independents were represented at the parley. Gas-transmission firms were left out.

Main purpose: Find out what producers might do to comply with FPC's new policy and its effect on forthcoming proceedings before the agency.

Industry notebook: J. R. Parten, Houston oil man, has been offered a high post in Interior Department. If Parten declines, reports say, another southwestern oil man will be sought for the job...Adjustments in area pricing policy are planned by FPC soon...The Enco brand name, Humble's possible national trademark, is now being tested in Wisconsin... Ashland has long-term contracts to sell about 90% of estimated output of its new Hydeal unit now under construction.

Merger of WPRA and NPA into one refiners' association is dead—at least for the near future.

NPA has rejected WPRA proposal, and no further action is contemplated. Two associations have 24 members in common. Idea for the merger has been under consideration since early this year (Newsletter, April 4).

Market Memo

Dec. 26, 1960

Subnormal temperatures over a major part of the nation have given a real boost to demand for heating oils. Result is increase in tank wagon prices which give needed support to earlier hikes at wholesale levels.

The recent contraseasonal reduction in gasoline inventory also has produced optimistic conversation that current gasoline postings likely will hold for the rest of the year.

Markets along the Great Lakes Pipe Line are firm with No. 1 posted at 10.5 cents and No. 2 at 9.5 cents. No discounts are reported.

Discounts of one-quarter cent are being made on 91-RON gasoline, posted at 12.5 cents.

Chicago markets are in good shape with early December postings of 10.5 cents on No. 1 and 9.75 on No. 2 subject to discounts from very few sources. Continued cold weather may eliminate even these price cutters.

Posting of 12.625 cents for 92-RON gasoline is freely discounted by one-quarter cent, but this is not alarming in view of the season.

River markets are firmer on middle distillates, although demand is not as strong here as in Midwest or Midcontinent. Both No. 1 and No. 2 are being held for seasonal price of one-eighth to three-eighths cent over Gulf Coast low postings of 9.25 cents and 8.5 cents.

Gulf Coast markets are virtually without spot buyer interest except for Bunker C fuel.

Recent one-quarter cent increase in postings for kerosine and No. 2 reflect East Coast price boosts. New prices of 9.25 cents for kerosine and 8.5 for No. 2 are not yet backed up by spot buying. Continued severe weather on the East Coast, however, may change this.

There have been no spot cargo gasoline sales from the Gulf Coast in many weeks. Posted price is 11.25 cents for 92-RON with rumored discounts of three-eighths to one-half cent. A firm buying order, however, is needed to test them.

Day when every refiner can turn out tailor-made gasoline may not be far off. Wilshire Oil last week unveiled the industry's first electronic blender which gives more exact blending. Next step can be an automatic stream analyzer to feed process data to a computer, which in turn could make blend adjustments to compensate for process variations.

Good Wells Make Good News

A Report on Some Recent Interesting Acidizing Treatments

December 26, 1960

New acidizing techniques -- with or without supplementary Dowell materials -- continue to extend the usefulness of acid treatments for stimulation. Here are four recent examples:

- **Franklin County, East Texas** (New Gas Well) This well was completed through perforations from 11,990 to 12,320 feet. Pay was limestone. Production before treatment was only 400 mcfd through a 22/64-inch choke. Dowell engineered a 6-stage acid treatment to stimulate the more permeable sections of the pay. Materials used included 30,000 gallons Retarded Acid, 10,000 gallons regular Dowell acid with surfactant added, and 4536 gallons Fixafrac* temporary plugging material. Each stage consisted of 1000 gallons regular acid, then 3000 gallons Retarded Acid, followed by 15 barrels temporary plug. Tubing pressure was 6000 psi maximum. Injection rate was 7.8 bpm maximum. After treatment, well produced 6400 mcfd through a 28/64-inch choke -- 16-fold increase.

- **Smith County, Mississippi** (Old Oil Well) This well was completed into the Wells sand through perforations from 13,801 to 13,812 feet. Before treatment, well was making 83 bopd through a 9/64-inch choke. Dowell treated with 500 gallons Super Mud Acid, spearheaded by 10 gallons Freflo* surfactant in oil, 20 gallons Freflo in oil followed the acid. After treatment, well flowed 237 bopd and 1200 mcfd of gas through an 8/64-inch choke. Flowing pressure was 2600 psi.

- **Wilbarger County, North Texas** (New Oil Well) Considerable mud had been lost in the Caddo lime and the well made no oil upon completion. Dowell designed a treatment using the Acid Guide*. 500 gallons BDA* (Breakdown Acid) was squeezed into the pay and the well flowed 10 bopd on test. Then, 9500 gallons Retarded Acid (acid-oil emulsion type) were injected at 5 bpm. After swabbing, well flowed 420 bopd and is now producing 56 bopd.

- **Swan Hills Area, Alberta, Canada** (Old Oil Well) Pay was the Slave Point Mid-Devonian vuggy lime. Well was completed about one year ago through perforations from 9068 to 9086 feet. Initial production looked good after small acid job, but soon dropped off to nothing. Recently, Dowell acidized using 4000 gallons Retarded Acid (acid-oil emulsion type) and 500 gallons Dowell regular acid with surfactant and demulsifier added. Materials were applied in following order: 2000 gallons Retarded Acid, 20 ball sealers, 250 gallons regular acid, 1000 gallons Retarded Acid, 250 gallons regular acid, and then 1000 gallons Retarded Acid. Final injection rate was 6 bpm at 3500 psi. After clean-up, well made 218 bopd on an 11/64-inch choke. Operator is considering this type stimulation for all his wells in area.

Dowell engineers have a number of new acidizing ideas on how to help you improve your net profits. For service or more information, call Dowell. Dowell services and products are offered from more than 150 offices and stations in the United States, Canada, Venezuela, Argentina, Germany, France and the Sahara area. Dowell, Tulsa 1, Oklahoma.

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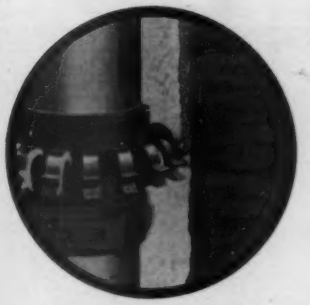
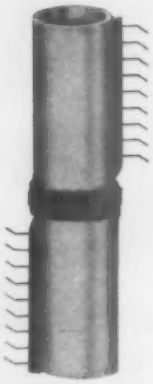


A CLEAN START

. . . means a better completion



ROTO WALL CLEANERS
INSTALLED WITH
E Z LOK LIMIT CLAMPS

RECIPO WALL CLEANER

Today, you can buy the finest cementing materials – custom mixed for a specific well . . . the best cementing equipment – developed by Halliburton and proven in the toughest tests . . . the most experienced men – Halliburton men who know their job . . . but all of this planning and investment can be wasted *if you fail to clean the well bore properly before cementing.*

Give your well completion a good beginning with these Halliburton tools:

HALLIBURTON ROTO WALL CLEANERS – have a sturdy steel base equipped with stout metal cleaning fingers. Roto Wall Cleaners can be clamped, banded or tack welded to the casing. In position at casing point, the metal fingers reach out and clean away bond-preventing filter cake from the well bore as the casing is rotated.

HALLIBURTON RECIPO WALL CLEANERS – are hinged for easy installation around the casing. Near bottom, the casing is lifted and lowered throughout the cementing job. This action causes the rubber fingers on the Cleaner to clean the well bore, giving a better bonding surface for the cement and help prevent cement channeling.

HALLIBURTON S-3 CENTRALIZERS – help keep the casing centered in the hole so that the Cleaners can do their most effective work. The Model S-3 is available in all standard casing and tubing sizes.

HALLIBURTON E Z LOK LIMIT CLAMPS – are used to securely hold casing tools on the string. They are inexpensive, easy to install, and completely eliminate tack welding the tools in place.

Get the *best* job possible with the *best* tools – Halliburton tools.

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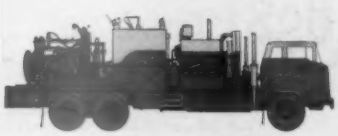

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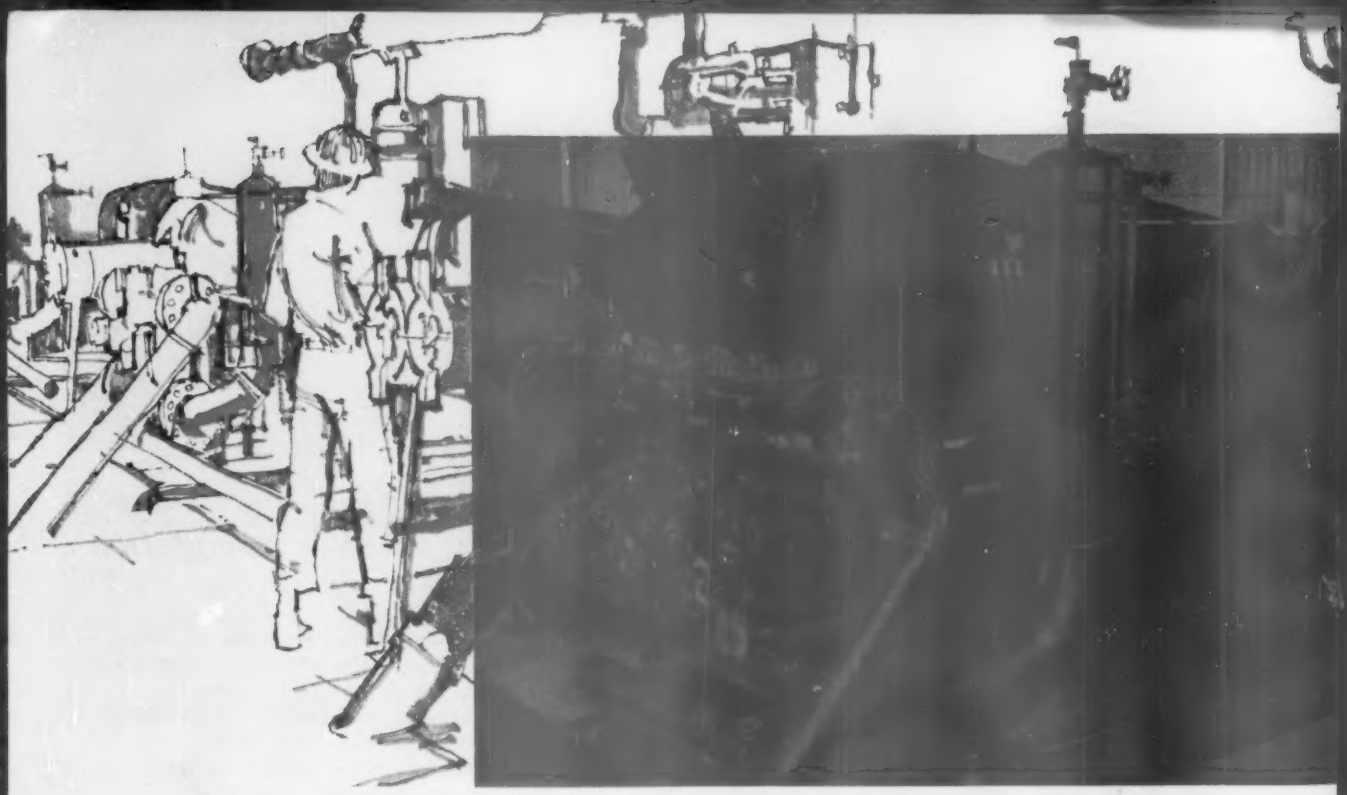
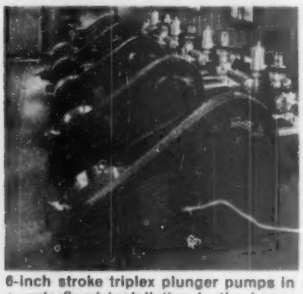
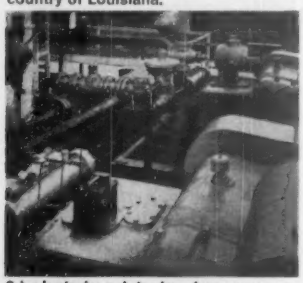


4-inch stroke triplex plunger pumps in waterflood service near Clay City, Illinois.



6-inch stroke triplex plunger pumps in a waterflood installation in the bayou country of Louisiana.



8-inch stroke quintuplex plunger pumps on the world's largest waterflood at Long Beach, California.

When big pumps are too big and small pumps are too small...here's the "flood" pump you need!

This "Oilwell" 8-inch triplex pump is exactly right for those "in between" waterflood pumping jobs. This is a rugged, horizontal-type pump with large access openings for quick and easy maintenance.

Operating at 200 rpm, this pump can handle 23,600 barrels per day at 600 psi or 5,890 barrels per day at 2400 psi. This wide volume-pressure range is made possible by a selection of three fluid ends. The high-pressure fluid end is used for the 2400 to 1400 psi range; the medium-pressure end, 1600 to 1000 psi; the low-pressure end, 1000 to 600 psi. These fluid ends are aluminum bronze for corrosive service or of other materials for special pumping requirements.

There's a wide range of "Oilwell" pumps for waterflood applications. You can get complete information at your nearest "Oilwell" store or from your "Oilwell" representative. Call him today.

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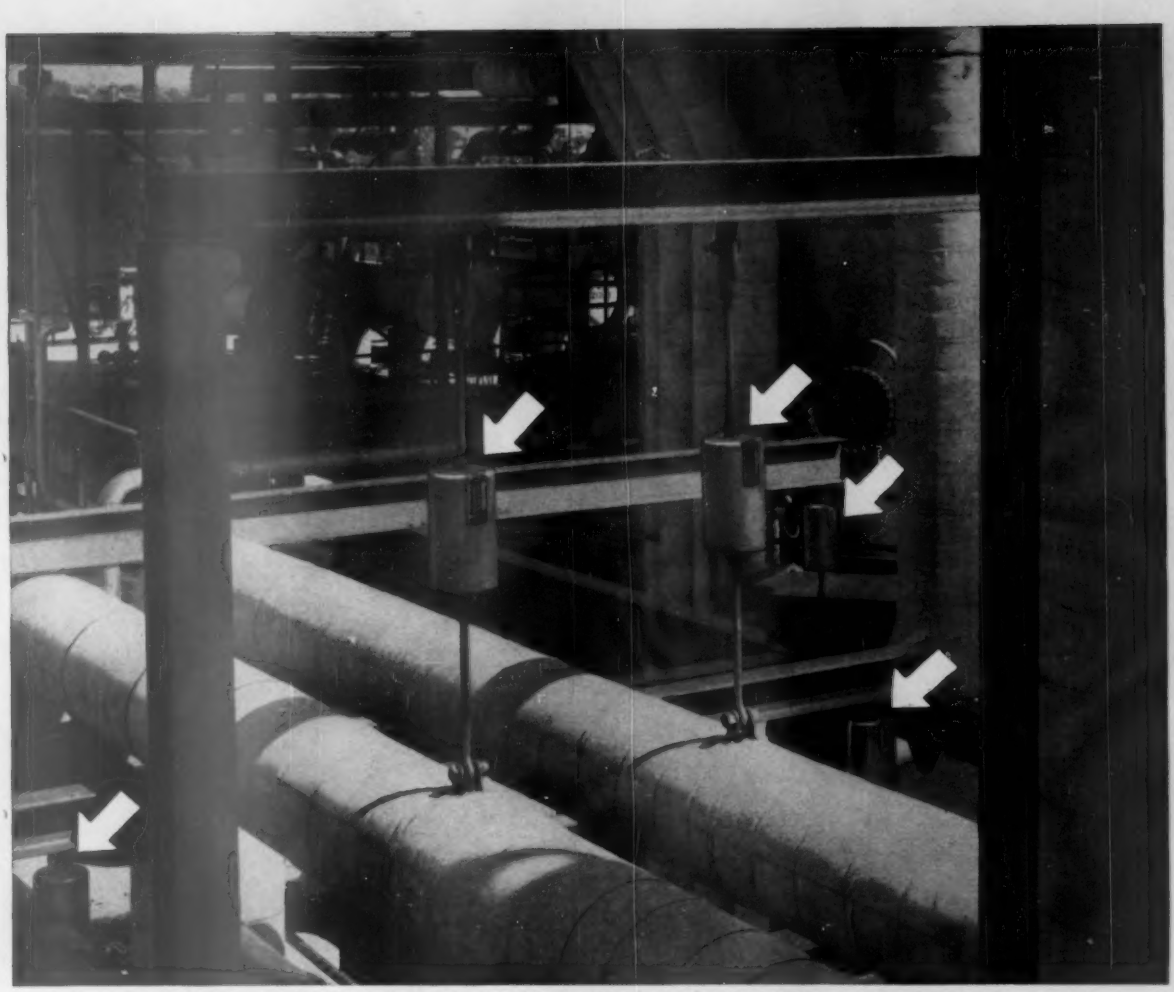
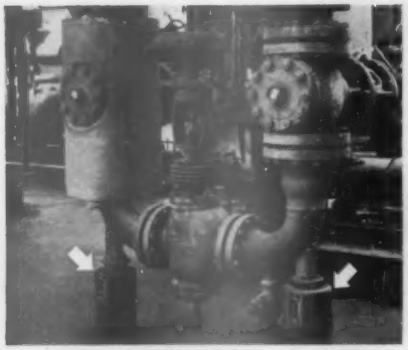


Heater feed line (r.) and return line (l.) at Sinclair Refinery show Grinnell Variable Spring Hangers at work.

Grinnell Hangers support high-temperature pipe lines at Sinclair Refinery



Grinnell Variable Spring Hangers support bottom lines on vacuum still operating at 750°F.

Hot news: Grinnell variable Spring Hangers support pipe lines at Sinclair Refining Company's Marcus Hook, Pa. plant, that operate at temperatures *above 500°F.* Yet these flexible hangers easily accommodate thermal movement in the pipe lines!

Where reactive forces at terminal points must be kept within specified limits, *Grinnell Constant Support Hangers* are recommended. Where pipe lines are subject to vertical movement and restrictive conditions do not require the use of a constant support type, *Grinnell Variable Spring Hangers* are recommended. Where abnormal horizontal movement or vibration in pipe lines must be prevented, *Grinnell Sway Braces* are recommended.

Grinnell maintains a staff of trained technicians... provides highly skilled advice and assistance right from the design stage... offers experienced field engineering service. Call Grinnell Company, 277 West Exchange Street, Providence 1, R. I.

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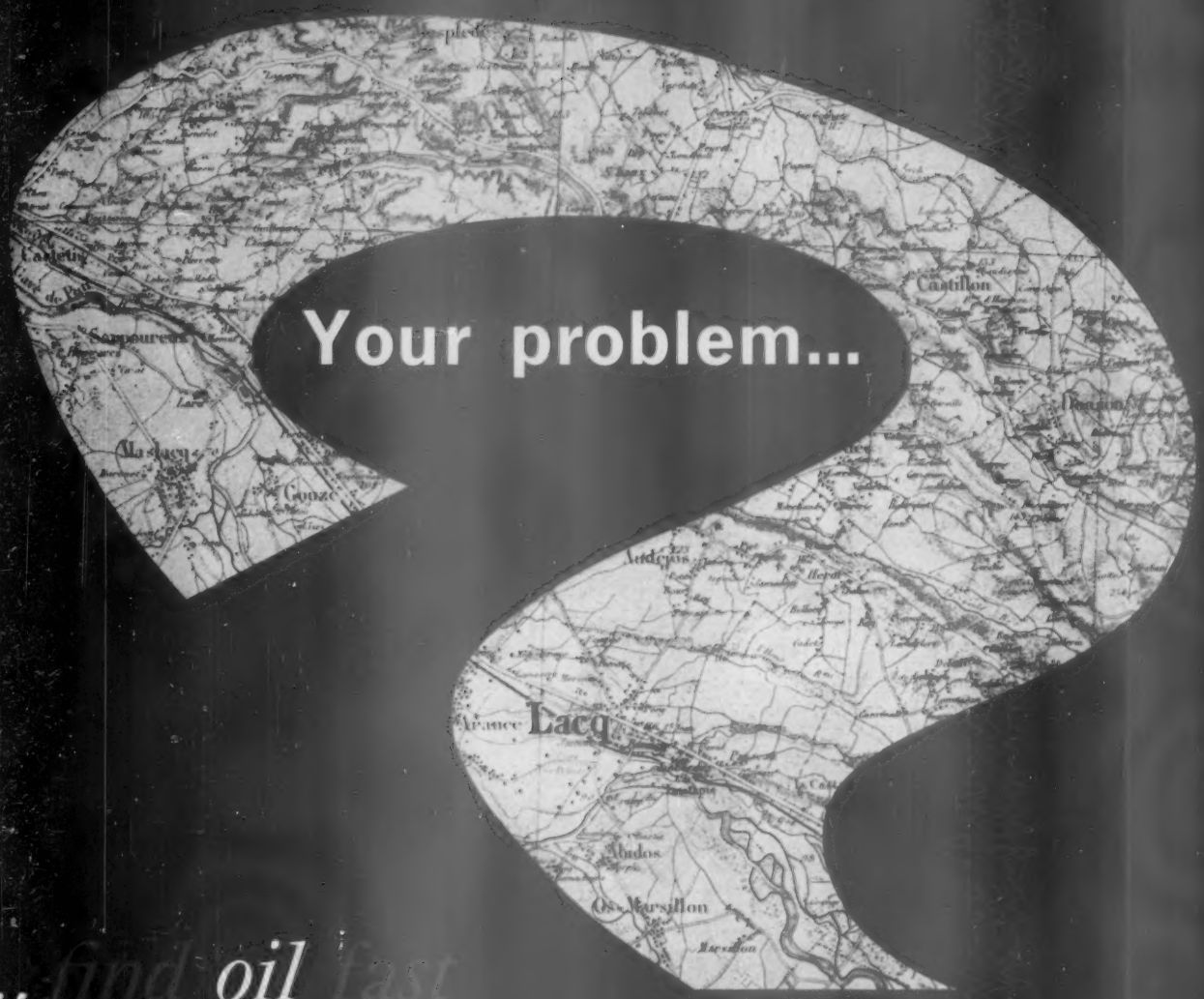

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Map drawn and edited by the Institut Géographique National.

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Hassi-Messaoud - Zarzaïtine
Tiguentourine - Hassi R'Mel

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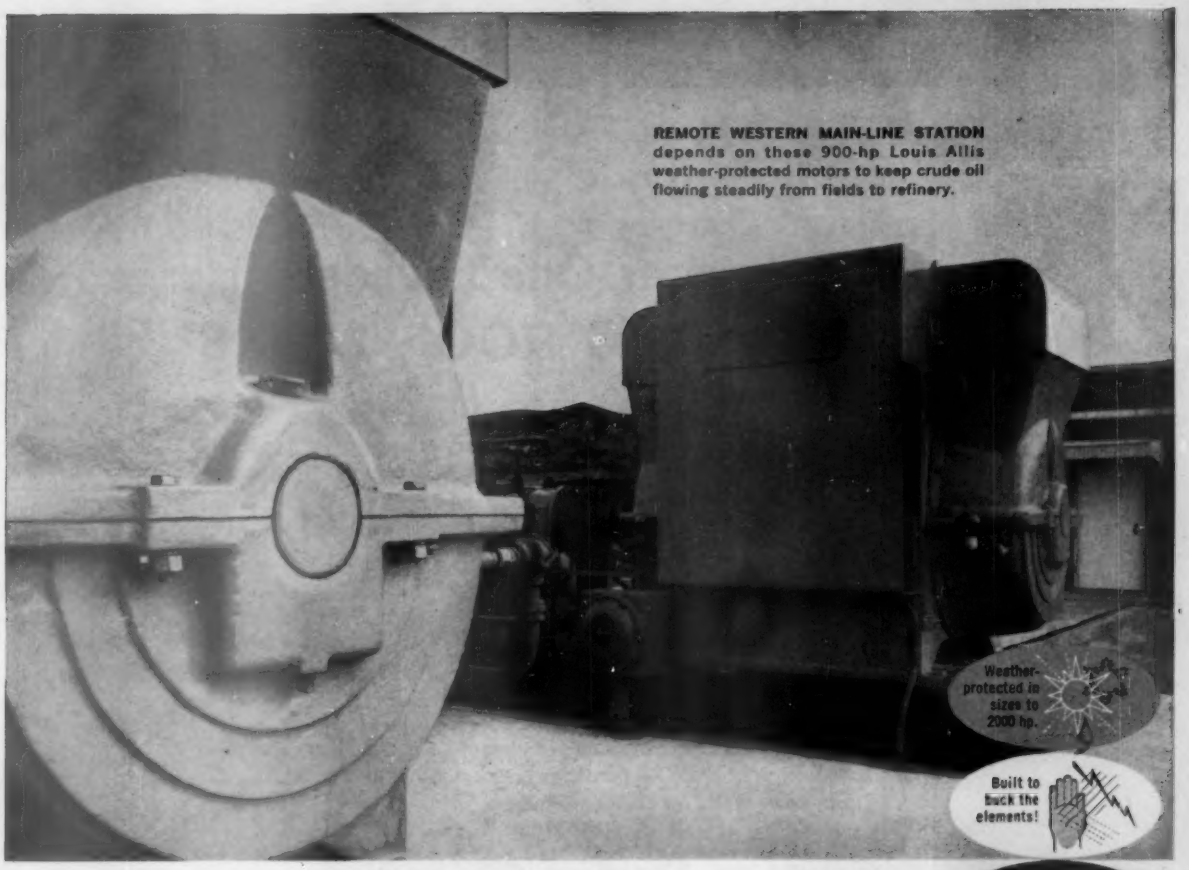

REMOTE WESTERN MAIN-LINE STATION depends on these 900-hp Louis Allis weather-protected motors to keep crude oil flowing steadily from fields to refinery.
Weather-protected in sizes to 2000 hp.
Built to buck the elements!

Here's weather-protected power for pipe-line outposts!

Louis Allis motors give you sure-power service in any weather—permit unattended operation of isolated installations.

You can count on these powerful weather-protected motors for non-stop pumping of oil from the fields to refinery and on to far-flung distribution stations. You can depend on them for virtually maintenance-free operation at any outpost. A periodic spot-check is all the attention they need.

Louis Allis all-weather design prevents contaminants from entering the motor. It assures steady power in driving rain, sleet, snow, or biting sandstorms — in bitter cold or in scorching desert heat. The treated corrosion-resistant all-welded steel housing shields the top and sides against falling and wind-driven contamination. A unique low-velocity, vertical-lift air-intake with stainless steel screens slows down cooling air and prevents air-borne dirt from being sucked into the windings.

The revolutionary MYLAR-GLASS-LECTON* insulation protects windings against corrosion and moisture — provides high dielectric and mechanical strength for long, trouble-free motor operation. Strip-type space heaters eliminate condensation problems normally present in these applications. Other long-life features include split-type cast iron bearing brackets; split-sleeve bearings with dual oil-ring lubrication; a seal and vent system to keep oil in and dirt out; and an oiler and sight gauge.

Louis Allis builds weather-protected motors in sizes from 250 to 2000 hp, with modifications to fit your needs — and provides expert engineering and field application help. Contact your Louis Allis District Office, or write for Bulletins 2550 and 2600 to The Louis Allis Co., 449 E. Stewart St., Milwaukee 1, Wis.

*MYLAR and LECTON are DuPont registered trademarks.

LOUIS ALLIS

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

Depend on CB&I ...

"Number One" builder of FLOATING ROOF TANKS

More CB&I-built floating roof tanks serve the petroleum industry than the total constructed by all other manufacturers. The reason is the superior design, construction and performance of CB&I structures . . . world leaders in reducing evaporation loss, retarding corrosion and minimizing fire hazard.

Typical of CB&I's *Craftsmanship in Steel* are the five Horton® Double-Deck Floating Roof Tanks shown below. Built for a major oil company in Venezuela, each has a capacity of 268,000 barrels.

CB&I also offers the widest choice of seals for floating roofs. These include liquid filled fabric, gas inflated fabric, resilient foam fabric and metallic seals.

CB&I offers the *coordinated services* of a world-wide organization with experienced CB&I erection crews ready to go to work on your job, now. Write for further details.

CHICAGO BRIDGE & IRON COMPANY

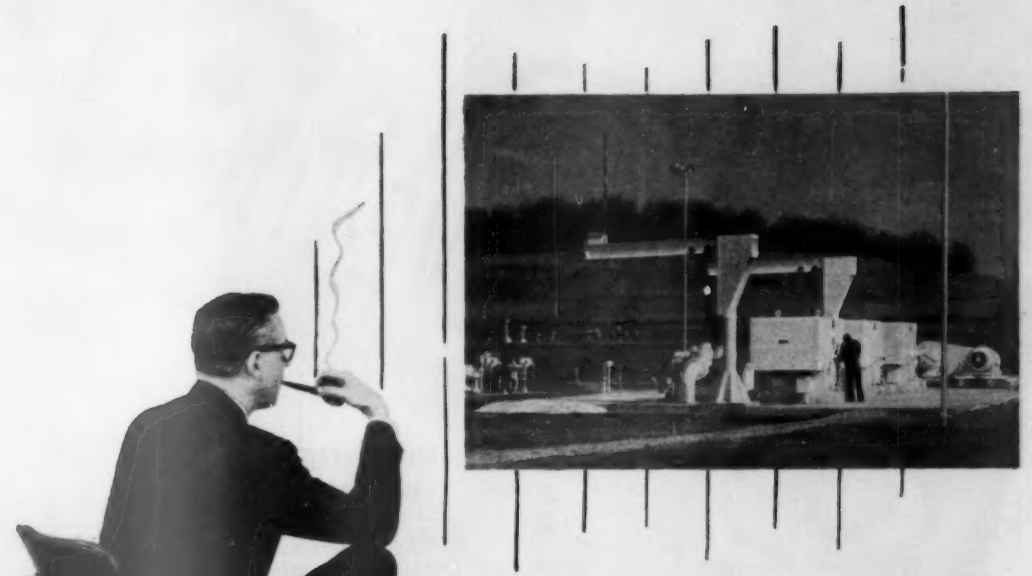
CBI

332 SOUTH MICHIGAN AVENUE
CHICAGO 4, ILLINOIS

OFFICES AND SUBSIDIARIES IN PRINCIPAL CITIES THROUGHOUT THE WORLD

P2CB

Memo to Management:



ECONOMY IS
NO PIPE DREAM
FOR PIPELINERS...
with Utility Electric Power

Here is another pipeline installation utilizing economical utility electric power to move an amazing amount of crude each day. This major company knows the value of efficient electric power and why it gives them more dependable, more economical power service . . . when and where it's needed. Now is the time to analyze your power costs. For the facts on electric power savings consult your Utility Electric Power Company.

A list of P.E.P.A. members will be furnished on request

PETROLEUM POWER ELECTRIC ASSOCIATION

BOX 35006, DALLAS 35, TEXAS

QUICK RETRIEVING OF A FISH CAN BE ACCOMPLISHED

MAJOR FISHING JOBS CAN BE PREVENTED

WHEN YOU KEEP A

BOWEN RELEASING AND CIRCULATING OVERSHOT

AVAILABLE

A high percentage of fishing jobs are the result of twist-offs. Immediate recovery action can PREVENT a troublesome, time-consuming, expensive fishing job.

The longer a fish remains in the hole, the greater the fishing problem becomes and the more difficult and costly it is to retrieve. Restore Circulation — Recover The Fish Fast — Prevent High Expense with a BOWEN RELEASING AND CIRCULATING OVERSHOT!

Bowen Overshots are compact, durable and powerful, and are capable of withstanding extreme pulling and jarring strains without damage to the tool or fish.

Bowen Overshots can be dressed to recover many different sizes of fish, to mill over, catch and pack off. They are available in a complete range of sizes for tubing and drill strings.

Send for complete technical literature!

For over 25 years—the world's leading manufacturer of fishing and specialty tools.

BOWEN ITCO, INC.
P. O. Box 4587
Houston 13, Texas, U.S.A.
Cable Address: ITCO

BOWEN

SUPPLIES FOR THE
PETROLEUM INDUSTRY

small orders... large orders

receive fast service
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Maintenance supplies or a drilling rig, whether the order is large or small, your Wilson Supply International representative will see to it you get **what** you want . . . **when** you want it. That's been the byword of Wilson Supply operations for 39 years.

Write for the list of suppliers Wilson Supply International represents, and for **fast,** dependable service, contact your Wilson Supply representative, or write: Wilson Supply International, P.O. Drawer 19, Houston.

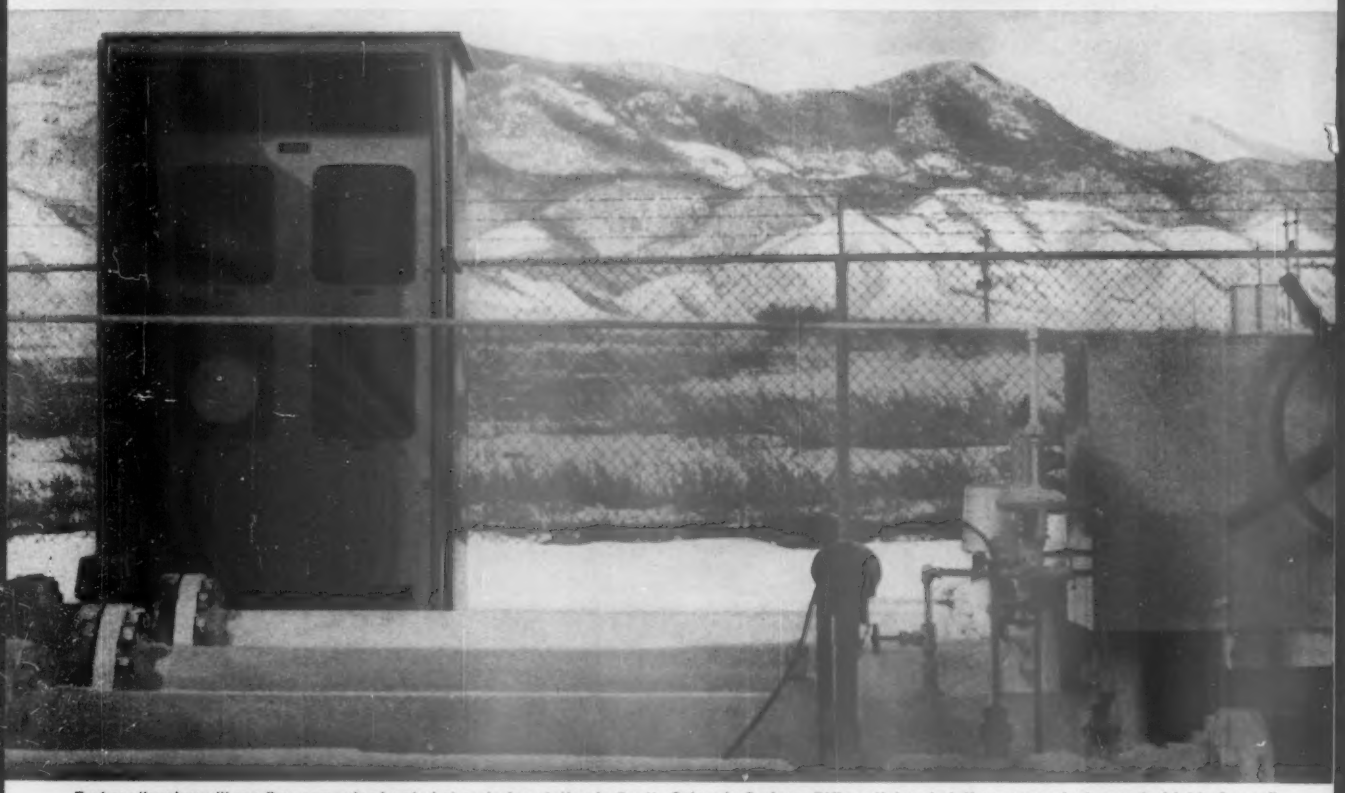
Drilling Machinery • Packaged Compressors • Tubular Goods • Fishing Tools • Production Equipment • Oil and Gas Supplies • Pipe Lines • Refineries

"WHAT YOU WANT – WHEN YOU WANT IT"

WILSON SUPPLY INTERNATIONAL DIVISION

6006

This Colorado Interstate Dispatcher is reading gas flow data from four different states...



Foxboro "packaged" gas flow computer located at metering station in South Colorado Springs. Differential and static pressure instruments (right of panel) convert measurements to electrical inputs for the Dynalog* Computer-Telemeter (lower left). Instrument at upper left telemeters down-stream gas pressure.

Foxboro Gas Flow Computing Systems deliver it continuously, automatically

Continuous gas flow totals from 20 metering stations, scattered across four Rocky Mountain states. That's the information Foxboro Gas Flow Computers provide for Colorado Interstate Gas Company in Colorado Springs.

Foxboro Gas Flow Computers do their computing at the metering point. Compensation for temperature and pressure is done on the spot with only total gas flow values being transmitted. Result: transmission line space is saved; errors common to systems that transmit several values are reduced.

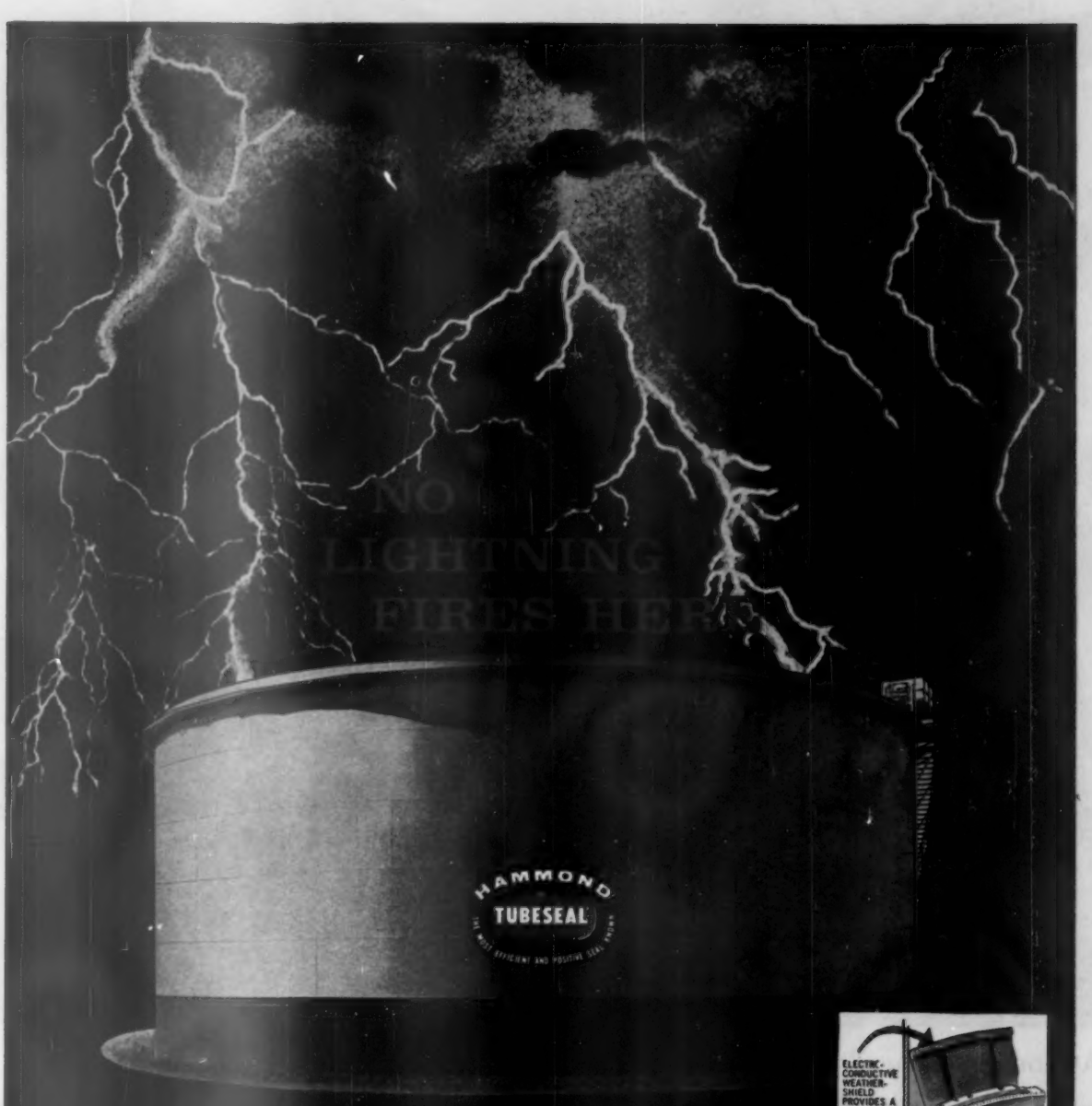
Foxboro Gas Flow Computers are furnished as a complete "packaged" unit — calibrated and tested as a system before shipment — ready to install.

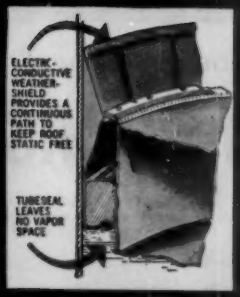
For single meter runs — for multiple runs, you can't beat the accuracy or the reliability of this Foxboro system. Ask your local Foxboro Field Engineer for details.

The Foxboro Company, 6012 Neponset Avenue, Foxboro, Massachusetts. *Reg. U. S. Pat. Off.*

FOXBORO

REG. U.S. PAT. OFF.




ELECTRIC-CONDUCTIVE WEATHER-SHIELD PROVIDES A CONTINUOUS PATH TO KEEP ROOF STATIC FREE
TUBESEAL LEAVES NO VAPOR SPACE

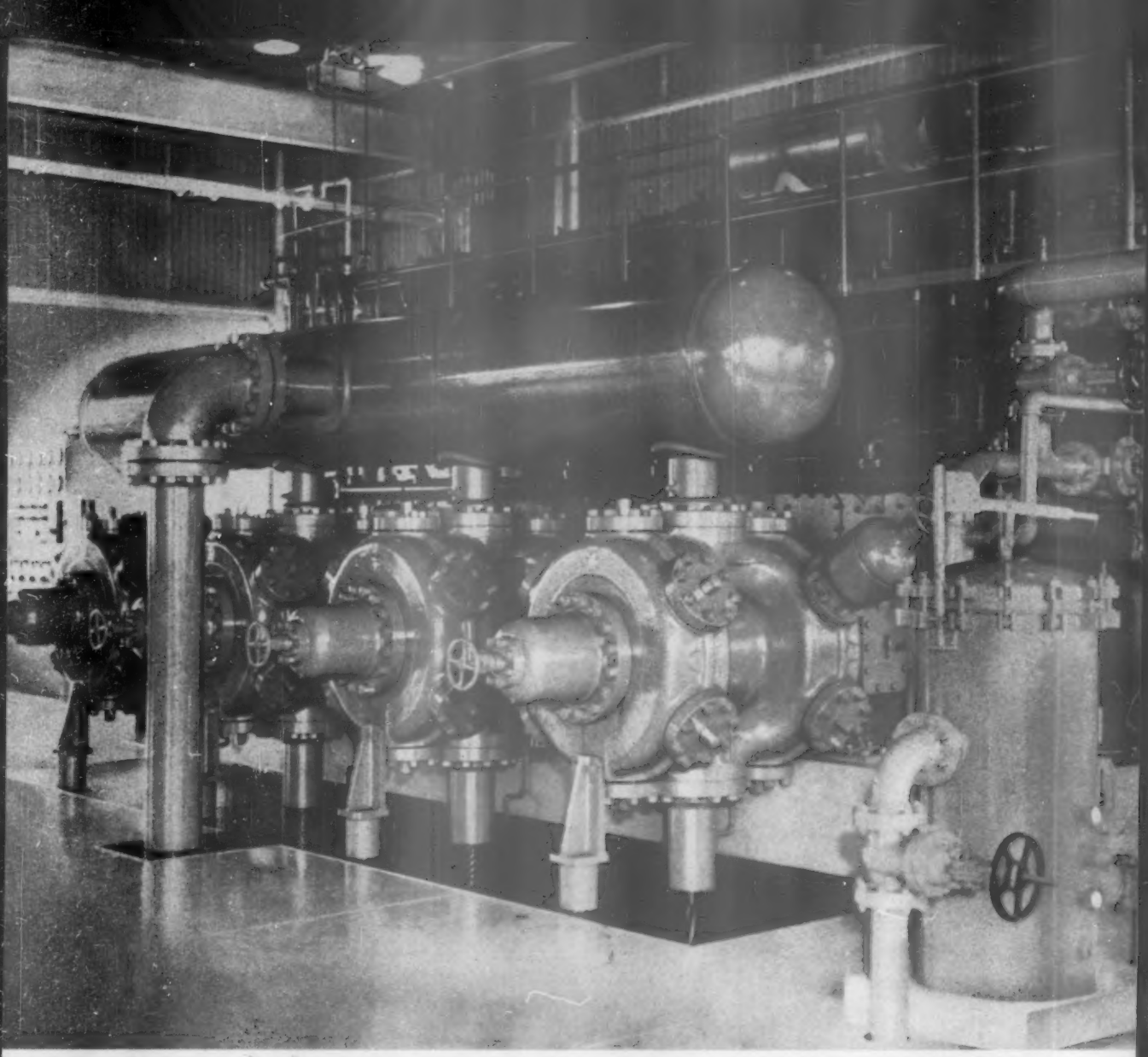
Tubeseal System Floating Roof Tanks are positively "lightning-proof." Not one instance of lightning fire has been experienced in the more than 600 installations throughout the world! ■ Two design features are responsible for this enviable safety record: (1) The patented, electro-conductive weather shield and (2) The elimination of all space where vapors can form. ■ The Tubeseal electro-conductive weather shield provides a *continuous* grounding bond between deck and shell. Static charges just can't concentrate. They are dissipated fully and immediately. And with no vapor to ignite, absolute protection against fire is assured. ■ The Tubeseal Floating Roof can be installed on new or old tanks, of riveted or welded construction. It is the most effective, as well as the safest, conservation system for storing volatile products including *JET FUELS. Send today for Bulletin.*

PDM

12 plants to serve you coast to coast

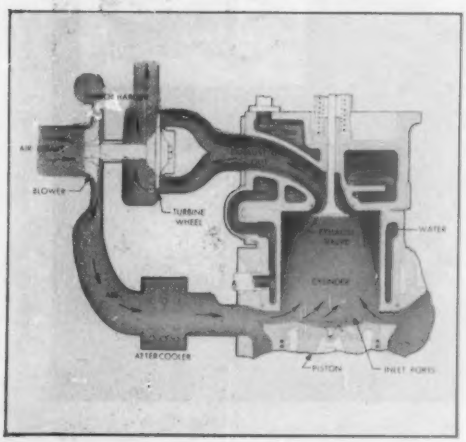
PITTSBURGH, WARREN, BRISTOL, PA. • BALTIMORE • BIRMINGHAM • DES MOINES
PROVO, UTAH • CASPER, WYO. • SANTA CLARA, FRESNO, STOCKTON, CALIF.

HAMONDTANK



At Northern Natural's Clifton Station, this SUTC engine compressor operates

20 HOURS A DAY...FOR 3 STRAIGHT YEARS



Self-sustained turbocharging at any speed and load is possible because of SUTC's exclusive Uniflo scavenging.

Five years ago a remarkable new engine compressor was introduced.

Called the SUTC, this Worthington turbocharged 2-cycle engine compressor was unlike any other. Combustion air enters thru side inlet ports, *but the exhaust is thru overhead valves.* Valve timing can be arranged to give maximum supercharging effect.

On paper, straight-thru or "Uniflo" scavenging has many advantages. The turbocharger operates over the entire speed and load range without help from external sources. Scavenging efficiency is increased and pulsations practically eliminated.

Now came the real test. More than 130,000 hp were installed. Operators praised the SUTC's exceptionally smooth, quiet operation. Operational records confirm the machines reliability. Unit G-2312 is typical. This 8 cylinder, 2000 hp SUTC engine compressor was installed in 1957 in Northern Natural Gas Company's Clifton, Kansas Station. To date, it has logged over 20,000 hours—an average of more than 20 hours a day for 3 straight years. A sister unit installed last year has equalled this performance.

May we send you complete data on this unique engine compressor? Please write to H. C. Barten, Worthington Corporation, P.O. Box 953, Buffalo 5, N.Y.

WORTHINGTON

"Sometimes I Think We Could Treat the Oil Just by Setting a Drum of Visco on the Lease"

Reports on Emulsion-Breaker Performance with Visco 485 ... A Typical Visco Formula

Visco 485 is one of dozens of emulsion-breaker formulas that Visco has developed for specific production areas and well conditions. It has taken off like a rocket—often producing dry oil to storage on leases where tank rolling was routine . . . and proving once again that "the tough jobs go to Visco"!

Here are a few instances where Visco 485 has solved difficult treating problems—one of which led to the optimistic statement in the headline.

Rough Gas-Cut Oil and Acid Water

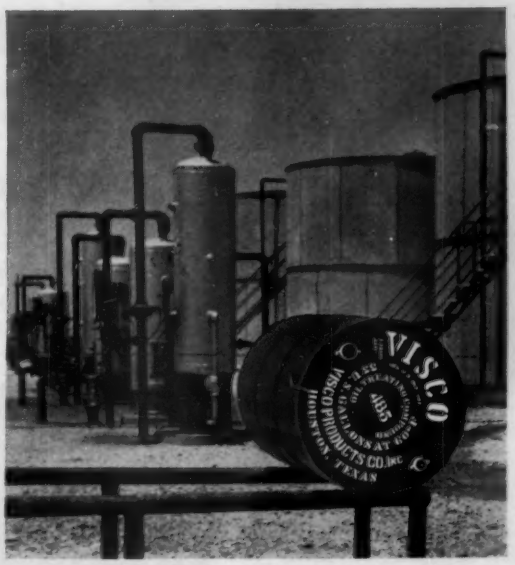
First 200-barrel tank from this new well had had 12 gallons of chemical and as much as 150° of heat . . . 1.0% water was still held up. Five gallons of Visco 485, and 30 minutes' rolling were all it took to sell the tank at 0.2% water.

Cut Chemical Feed 66%

Retreating was common on this lease. 80 to 90 barrels of oil per day took 1½ gallons of chemical. Test of Visco 485 produced 0.1 to 0.2% water in oil with only ½ gallon per day treatment. Results are uniformly good; superintendent plans to put Visco 485 on all remaining leases in the field.

Lowered Gas Heat Bill $300/Month

High tank bottoms, high heat, high treating costs—then Visco 485 and Visco 958 Paraffin Inhibitor were plant tested. Chemical consumption dropped from 10 quarts/500 bbls. to one quart 485 and 2 quarts 958. Tank bottoms disappeared. Heat was lowered from 125°F. to 70°F. for a $300/month gas bill saving. Lowered treating costs with Visco are capped with better oil quality.



Marvel Treater and 485 Cut B.S. & W. 20%

Oil from a new well was 19° gravity, pour point 51°F., 54% asphalt, 21% B.S. & W. Visco 485 was thoroughly dispersed in this heavy crude with a Marvel Treater. Result: 0.4% B.S. & W. Tests without the Marvel Treater could not bring B.S. & W. below 2.3%.

Visco sells or leases Marvel Treaters as an added Visco service to producers. Detailed data will be sent promptly on request.

Try Visco On a Tough One

Pick a well that is giving you emulsion-breaker troubles . . . high treating costs, tight emulsion, tank bottoms or heating problems. Let your Visco Field Service Man make a plant test for you. Odds favor him to come up with answers that can help you cut costs—and get dry oil, too. Call or write for Visco action today.

VISCO PRODUCTS COMPANY
Incorporated
A Unit of Nalco Chemical Company
1020 Holcombe Boulevard **Houston 25, Texas**

Deutsche Nalco-Chemie, G.m.b.H., Frankfort, Germany
Nalco Italiana, S.p.A., Rome, Italy
Nalco de Mexico, S.A. de C.V., Mexico, D.F., Mexico
Nalco de Venezuela, C.A., Caracas, Venezuela

Visco® ... *Serving the Oil Industry through Practical Applied Science*

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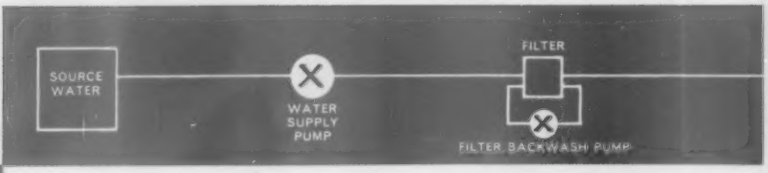


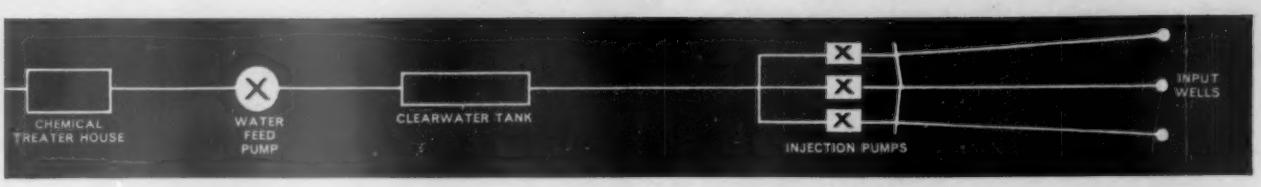
"RIGHT DOWN THE GARDNER-DENVER

This petroleum engineer, experienced in all types of waterflood applications, knows firsthand the Gardner-Denver pump reputation for long, trouble-free service in the field. He always knows that he gets exactly what he needs in Gardner-Denver's rugged construction. With Gardner-Denver pumps

Gardner-Denver's plant facilities assure oil field customers quick, competent service on a full line of waterflood pumping units. Expert engineers and machinists tailor these units to customer specifications. Parts and service are readily available wherever oil men work.

SEE YOUR GARDNER-DENVER WATERFLOOD SPECIALIST

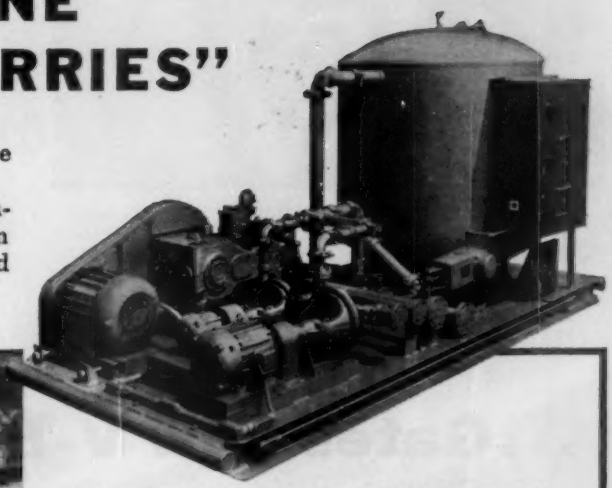
EXPERIENCED HELP—When production men want to boost well output, they need a pump package engineered to particular field conditions. Gardner-Denver's knowledge, accumulated through decades of oil field service, can help you determine the exact combination you need.



WATERFLOOD LINE ENDS PUMP WORRIES"

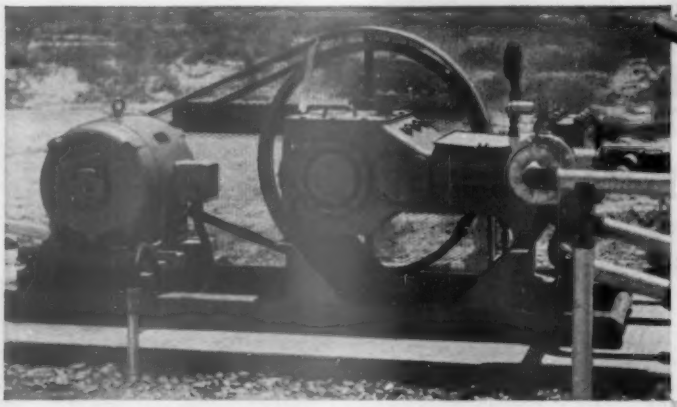
on the waterflood job, he's assured of worry-free operation—continuously.

To end your pump worries on waterflood operations, specify Gardner-Denver pumps right down the line—for water supply, filter backwash and water feed, as well as water injection.



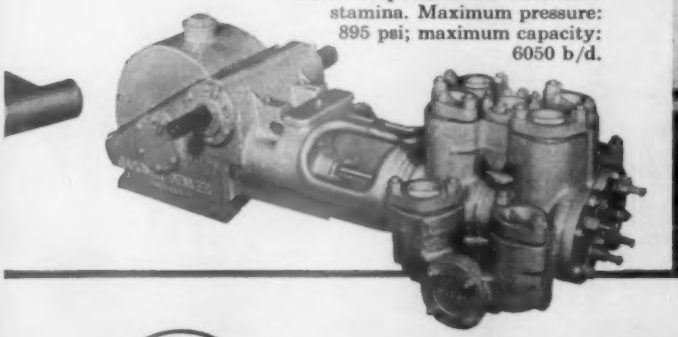
Gardner-Denver's new portable water injection and filter system unit is self-contained, portable and automatic. It includes triplex plunger injection pump, separate backwash and filter cycle pumps, filter tank, electric motors, piping and controls—all compactly mounted on an oil field skid.

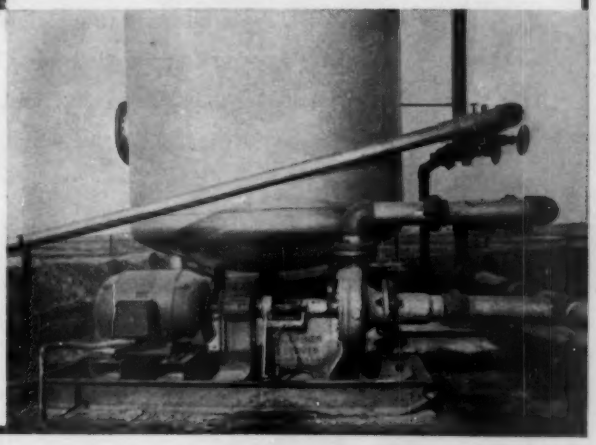
Gardner-Denver's broad range of centrifugal pumps are rated for volumes up to 4800 gpm or for heads up to 300 feet.



Gardner-Denver triplex plunger pumps have ratings of 15 to 200 hp, maximum pressure of 3050 psi, maximum capacity of 12,950 b/d.

Gardner-Denver duplex piston pumps share a reputation for waterflood stamina. Maximum pressure: 895 psi; maximum capacity: 6050 b/d.





EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER - DENVER

Gardner-Denver Company, Quincy, Illinois

In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario

Gardner-Denver International Division, 233 Broadway, New York 7, N.Y.

Petroleum Offices: Casper, Cleveland, Columbus, Corpus Christi, Dallas, Denver, Durango, Edmonton, Ellinwood, Evansville, Houston, Huntington, Jackson, Kansas City, Lafayette, Los Angeles, Mexico City, New Orleans, Odessa, Oklahoma City, Pittsburgh, San Francisco, Shreveport, St. Louis, Tulsa, Wichita, Winnipeg

10 MILES OFFSHORE, Shell Oil's Platform Z pumps crude oil from the East Bay Field, working 24-hours-a-day, 7-days-a-week. PROBLEM: To insure continuous operation, with NO down-time, NO time-out. SOLUTION: Gates Super HC V-Belt Drive, with only 5 belts doing the work of 8 conventional belts. BONUS SAVINGS: $25.36 less drive cost, 33.3% less drive space.

or inland

130 MILES INLAND, The California Company's Raleigh Field operation requires 24-hour-a-day, 7-day-a-week flooding. PROBLEM: To eliminate possible sources of down-time and time-out. SOLUTION: Gates Super HC V-Belt Drive, with 3 belts doing the work of 4 conventional belts. BONUS SAVINGS: $74.97 less drive cost, 51.25% less drive space, 93 pounds less drive weight.

...Gates new V-Belt Drives cut down-time, drive cost

Throughout the oil industry, Gates Super High Capacity V-Belt Drives are meeting operators' demands for greater reliability, longer wear, drastically reduced down-time.

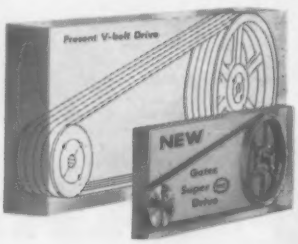
BUT—in addition to meeting these basic requirements of the Industry's power-transmission job, Gates Super High Capacity V-Belt Drives are delivering bonus savings—in drive cost, drive space, drive weight.

Suppliers of Gates V-Belts, and Gates Field Engineers are listed in the Yellow Pages in all major centers. Ask *your* distributor or supply house for a free copy of the handbook: *The Modern Way to Design Multiple V-Belt Drives.*

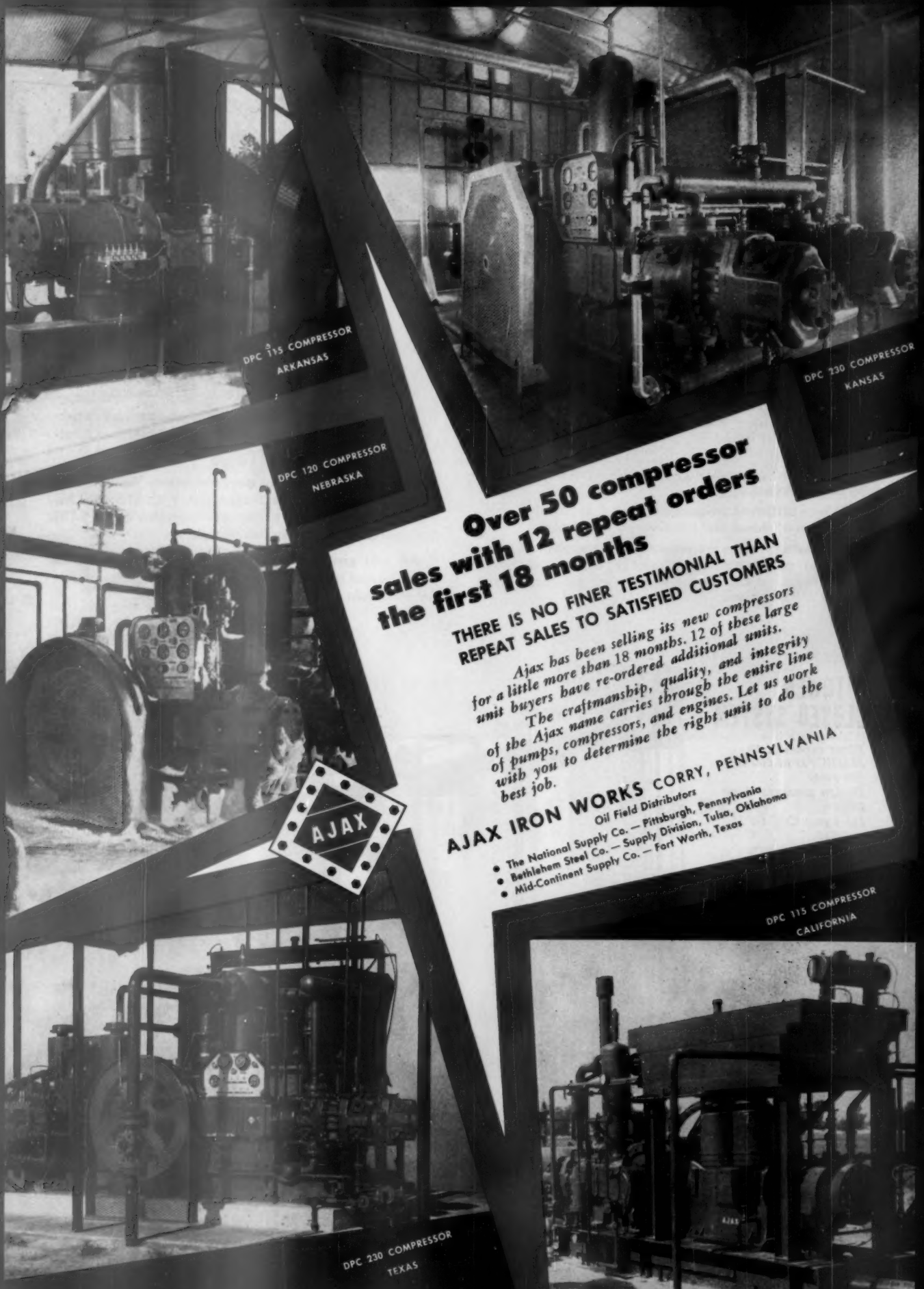
The Gates Rubber Company, Denver, Colorado

Gates

World's Largest Maker of V-Belts



GATES SUPER HC HIGH CAPACITY V-BELT DRIVES same hp capacity in smaller "package"



Over 50 compressor sales with 12 repeat orders the first 18 months

THERE IS NO FINER TESTIMONIAL THAN REPEAT SALES TO SATISFIED CUSTOMERS

Ajax has been selling its new compressors for a little more than 18 months. 12 of these large unit buyers have re-ordered additional units.

The craftmanship, quality, and integrity of the Ajax name carries through the entire line of pumps, compressors, and engines. Let us work with you to determine the right unit to do the best job.

AJAX IRON WORKS CORRY, PENNSYLVANIA

Oil Field Distributors

- The National Supply Co. — Pittsburgh, Pennsylvania
- Bethlehem Steel Co. — Supply Division, Tulsa, Oklahoma
- Mid-Continent Supply Co. — Fort Worth, Texas

You, too, can get dehydration at a profit . . .

DRY FRAC CONVERTS "EXPENSES" into PROFITS!

To most gas producers, the cost of dehydration is a necessary expense that is required to bring sales gas to pipeline specifications. There are many instances; however, where DRY FRAC can actually convert this expense into profits through initial or increased recovery of valuable hydrocarbons.

Here are four general situations where DRY FRAC can be used economically:

1. Where sufficient pressure drop is not available to operate conventional low temperature separation.
2. Downstream from conventional low temperature separation equipment where enough recoverable heavy fractions are still in the dehydrated gas to justify a DRY FRAC unit.
3. Where gas stream is too lean in heavy hydrocarbons to be processed economically by other means.
4. For dewpoint control where pipeline companies specify maximum hydrocarbon dewpoint as well as maximum water content.

Take another look at your gas production. You may not be realizing your full profit potential. With DRY FRAC you get dehydration to pipeline specification PLUS hydrocarbon recovery in one operation!

BS&B will give you accurate evaluation of wellstream potential and recommend the proper type and size of unit for maximum delivery and a quick payout!

4-TOWER CLOSED SYSTEM

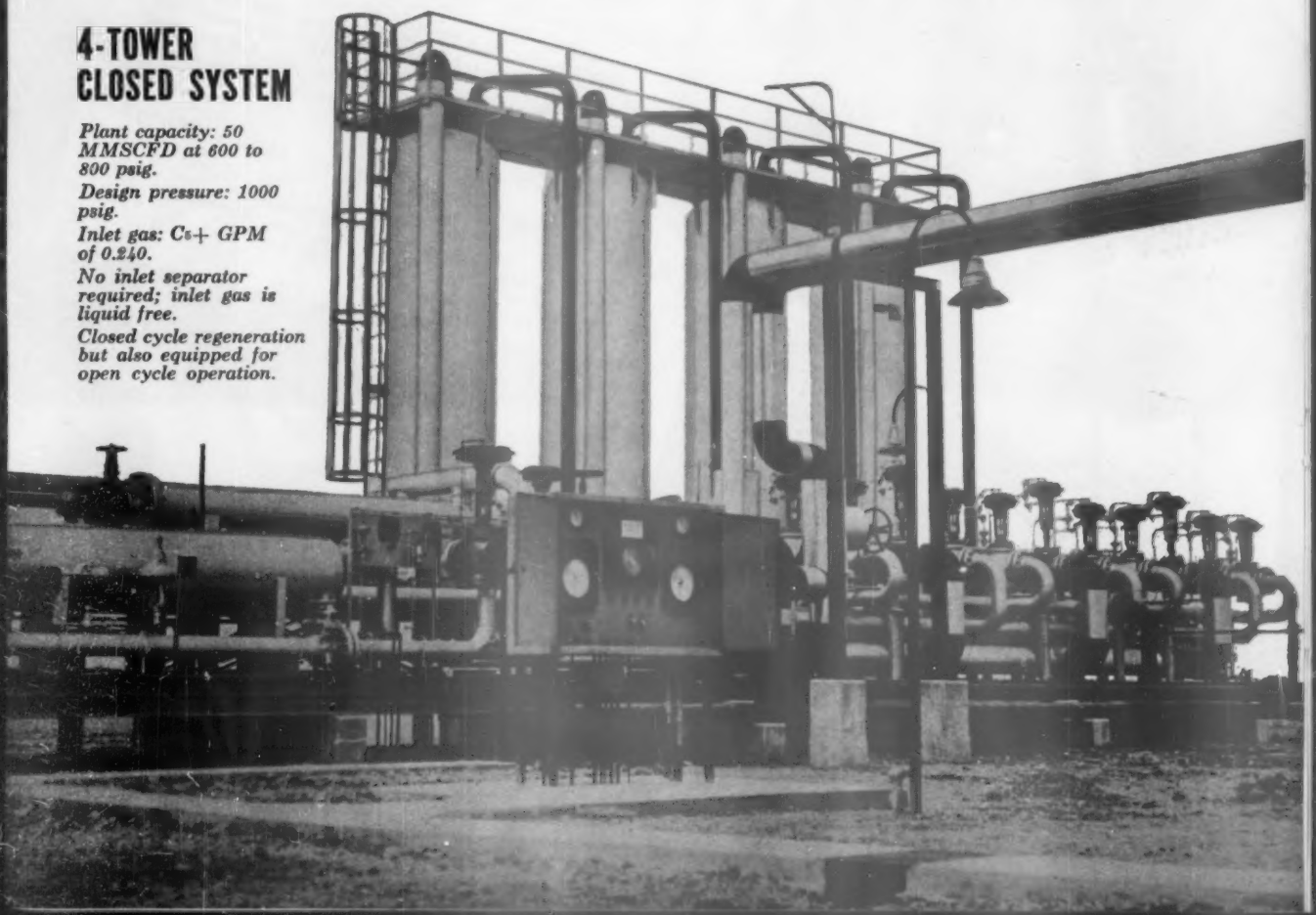
Plant capacity: 50 MMSCFD at 600 to 800 psig.

Design pressure: 1000 psig.

Inlet gas: C_5+ GPM of 0.240.

No inlet separator required; inlet gas is liquid free.

Closed cycle regeneration but also equipped for open cycle operation.



3-TOWER OPEN SYSTEM

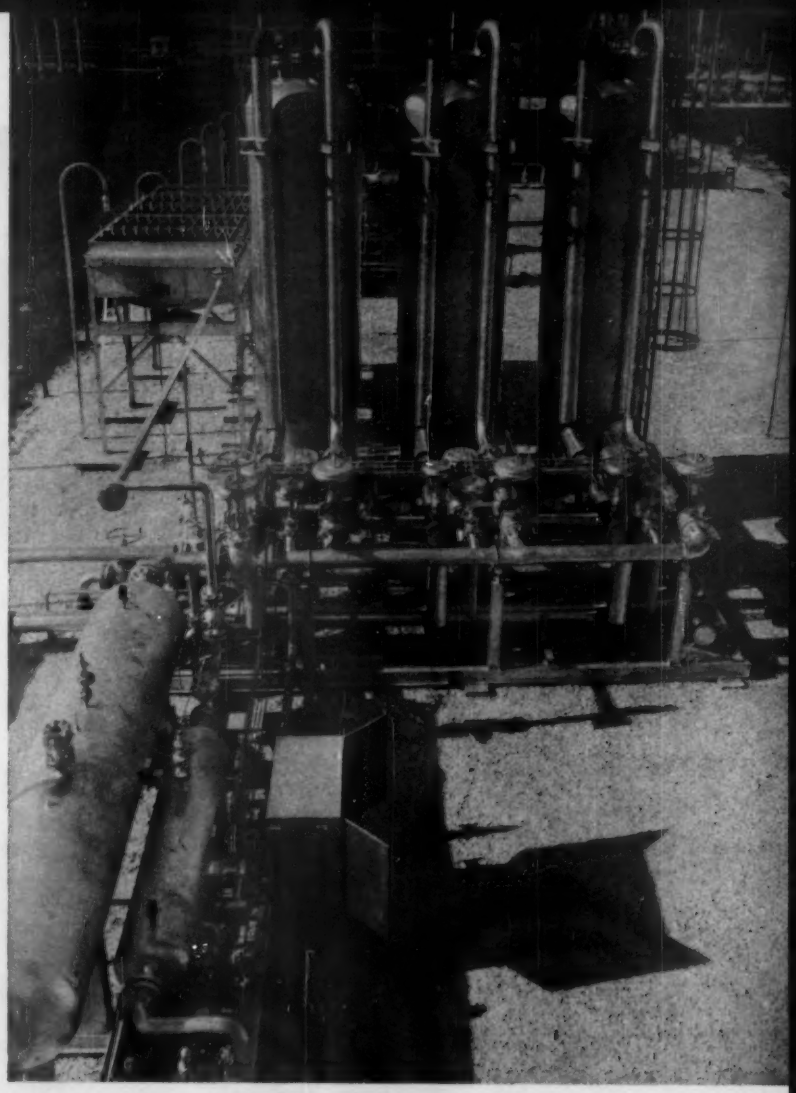
Plant capacity: 62 MMSCFD at 900 psig.
Design pressure: 1200 psig.
Inlet gas: C_5+ GPM of 0.067.
Open Cycle regeneration.

BASIC PROCESS OF DRY FRAC

DRY FRAC makes use of two or more dry desiccant beds to adsorb desired components from gas stream. When one bed becomes saturated, gas stream is switched through another bed. Saturated bed is then regenerated by passing heated gas through it to vaporize and drive off components which have been adsorbed on the desiccant. These components are condensed in heat exchange coolers and recovered from the regeneration gas stream.

Two types of regeneration systems may be used. In the "open" system, a side stream of gas from the main gas stream is forced through regeneration system to rejoin main stream ahead of inlet to the adsorbers. In the "closed" system, a trapped volume of gas is continuously recirculated through regeneration cycle by a blower.

DRY FRAC is basically similar to dry desiccant dehydrators except that drying and regeneration cycles have been shortened to utilize a greater weight of desiccant per unit volume of gas processed, while reducing size of adsorbers and total amount of desiccant required.



BS&B — ANOTHER EXAMPLE OF PRODUCT LEADERSHIP

BLACK, SIVALLS & BRYSON, INC.

Dept. 1-A12B P. O. Box 1714, Oklahoma City

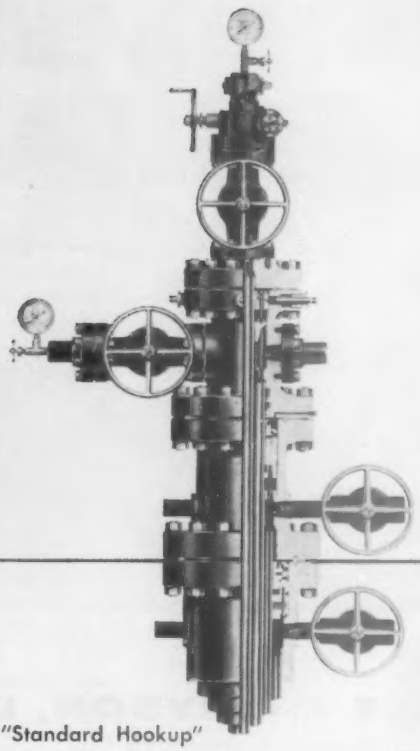
DRY FRAC is backed by BS&B's many years of engineering experience in all types of hydrocarbon recovery processes.

2-TOWER CLOSED SYSTEM

Plant capacity: 6.7 MMSCFD at 1000 psig.
Design pressure: 1200 psig.
Inlet gas: C_5+ GPM of 0.739, part of which is separated in inlet separator.
Closed cycle regeneration but also equipped for open cycle operation.

PERFORMANCE AND ECONOMY

for everyday production needs
are built into the
O-C-T "Standard Tree" and
Low Pressure Equipment



O-C-T "Standard Hookup"

C-18-H Casing Head with
T-H-S Flanged Bottom Tubing Head

C-M-T Casing Head and
T-H-S Tubing Head

While the Oil Center Tool Company is noted world-wide for dual production equipment and high pressure trees, the truth of the matter is many completions require what might be called "standard equipment." O-C-T is noted for this, too.

The "Standard Tree" is simply the combination of an O-C-T casing head, O-C-T tubing head, master valve of your choice, and an O-C-T flow control.

Simplicity is a basic part of the standard's makeup.

The new series of O-C-T low pressure equipment combines simplicity and flexibility. Tubing stripper can be used in combination with other equipment if desired, without the necessity for adding stripper housing or bowl. Threaded tubing hangers are available for use with or without the stripper.

(For additional details on the above equipment, write to O-C-T at the address below)

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OIL CENTER TOOL CO.

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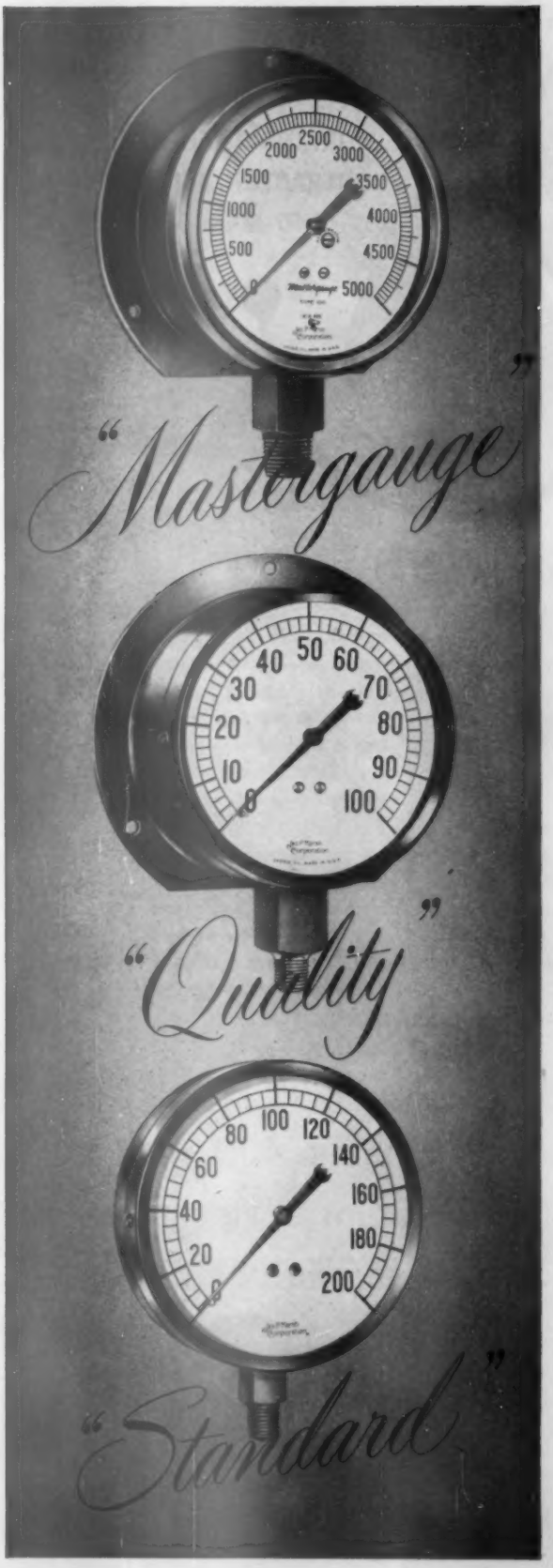

What pressure gauge for your particular need?

The clear-cut economical answer to your specific gauge problem is right here in the Marsh line. It is here because the Marsh line contains the world's most complete range of gauges in the three broad brackets of gauge applications.

THE "MASTERGAUGE" GROUP...for those extreme services that demand the ultimate in gauge precision, accuracy and stamina.

THE "QUALITY" GROUP...also for tough conditions, but less severe than the conditions served by the "Mastergauge" Group.

THE "STANDARD" GROUP...for the general run of pressure gauge services.

While these three brackets run a wide gamut of prices, the difference between them is not so much a matter of *grade* as a matter of *kind* and *purpose*. All gauges in all groups reflect Marsh precision and quality. Collectively they cover practically every conceivable gauge requirement.

The answer is in the catalog...but if you have a special problem let our engineering department work with you to select the most efficient, most economical solution to your problem.

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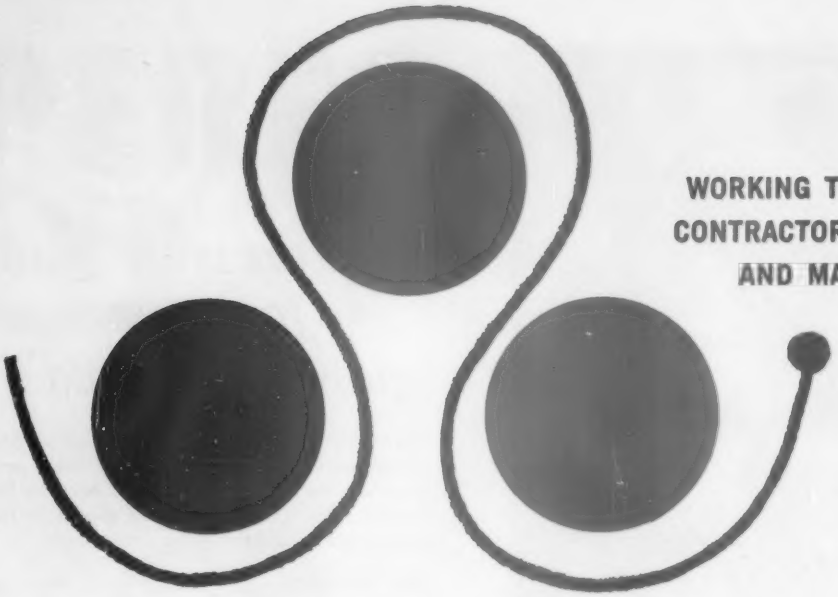
MARSH

"THE STANDARD OF ACCURACY"



WORKING TOGETHER... CONTRACTOR, PRODUCER, AND MAGCOBAR

plan mud programs for pay and profit

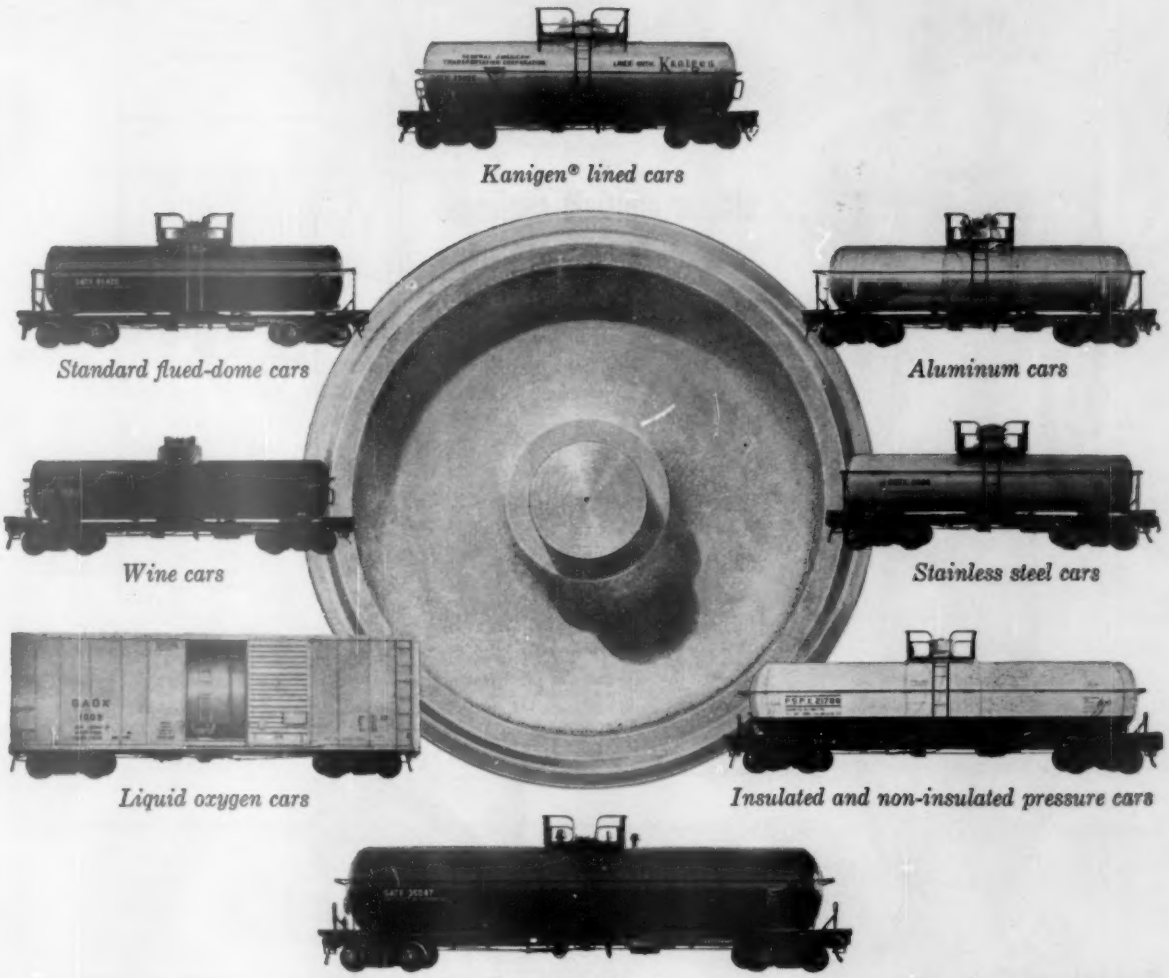
High drilling costs can be cut by efficient use of drilling fluids. The right drilling chemicals, **used right** by Magcobar engineers, can help increase penetration rates, save on trips and bits, reduce materials needed, and save on equipment and manpower.

But, to make sure that the mud program is the most efficient, it must be planned from the beginning. And, because it must deal with so many specifics it can be developed only with the close cooperation of producer, contractor, and Magcobar engineer. A sound mud program must be based on product performance, formations to be drilled, and, very important, type of equipment to be used.

By working together, a planned mud program can be developed to make full use of the money-saving advantages of Magcobar Technology. This Technology formulates special drilling fluids to reduce or prevent damage to the pay, resulting in quicker completion, higher production, and less need for expensive stimulation work. Magcobar Technology can help you as a contractor to drill wells more cheaply, can help you as a producer to have better wells. Drill your next wells with Planned Mud Programs with Magcobar.

Magcobar
Completes
DRILLING MUD SERVICE

GATX builds them all!



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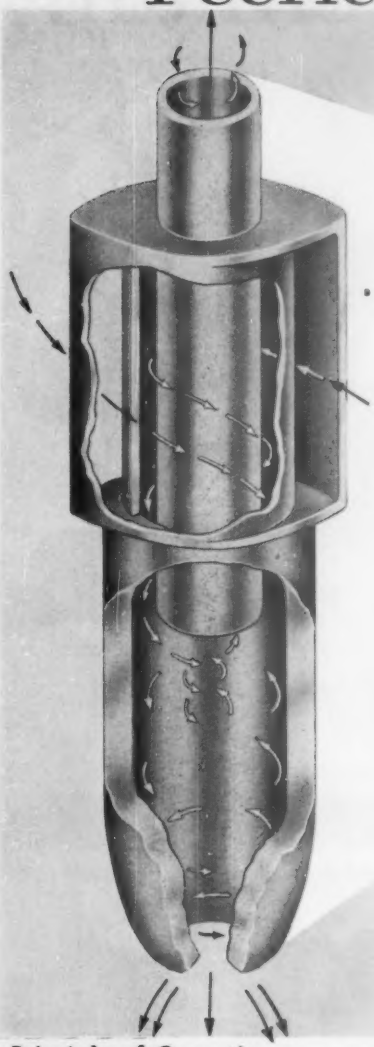
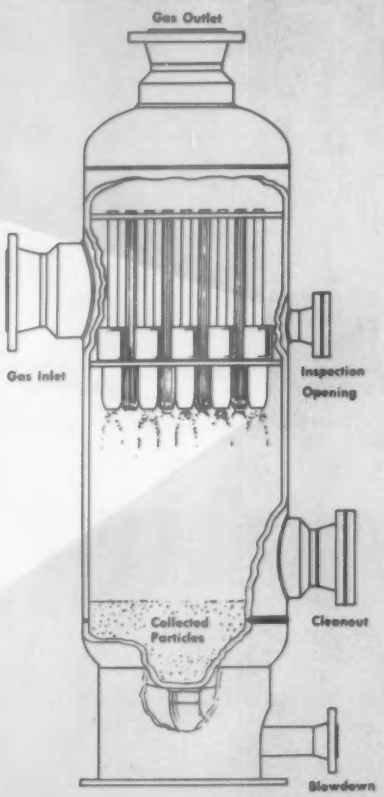
GATX GENERAL AMERICAN TRADE MARK

Another in a complete line of Peerless Scrubbers

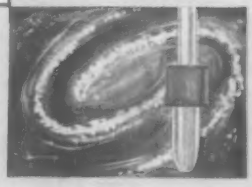
Peerless Dry Scrubber



. . . utilizes multiple cyclones to achieve high efficiency removal of troublesome dirt and liquid.



PEERLESS CYCLONE TUBE CONSTRUCTION . . . The cyclone elements are constructed of an alloy combining abrasion and corrosion resistance with shock-resistant qualities needed for reciprocating compressor station requirements.



Principle of Operation

The Peerless Dry Scrubber consists of small diameter cyclones in parallel to provide the centrifugal force necessary for efficient small particle removal at high pressures. Peerless Dry Scrubbers are offered in a complete range of sizes and working pressures to fit any scrubber requirements. Also available are compartmented scrubbers to handle the problems of widely varying flows with only one vessel where multiple scrubbers have been required heretofore. Write for descriptive literature.

Provides these important advantages

1. Efficient removal of dust and liquids.
2. Cannot be overloaded.
3. Uses no scrubbing oil, hence no oil loss.
4. Requires no oil filling or settling tanks.
5. Virtually maintenance free, requiring only occasional blowdown of collected material.
6. Ordinarily smaller and less costly than wet type scrubbers.

Engineering Assistance Available: Peerless makes all types of Scrubbers, including Dry Scrubbers, Oil Bath, both a fixed contactor type (Swirl-Gas Cleaner) and a revolving contactor type (Scrubosphere). In addition, Peerless makes Gas Filters. Ask us for recommendations on the type Scrubber best suited to your application.

SEPARATORS: Liquid Vapor
DUST SCRUBBERS: Wet and Dry Types
GAS FILTERS
GAS ODORIZERS
SILLERS CLOSURES
OTHER PRODUCTS: Engine Timers, Scraper Traps, Manways

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USS "T-1" TYPE A STEEL

Since its introduction in 1953, USS "T-1" Steel has become one of the world's best known steels. Its extraordinary strength, toughness, weldability and resistance to impact abrasion have increased service life of equipment as much as ten times. No other steel has equaled "T-1" Steel's record of success.

The new USS "T-1" Type A Steel is the first addition to this family of constructional alloy steels. It is a quenched and tempered constructional alloy steel produced in thicknesses through 1" maximum with the same tremendous strength, weldability and resistance to impact abrasion as "T-1" Steel. However, through the development of a new analysis, "T-1" Type A Steel is a *more economical* steel for many applications.

USS "T-1" Type A Steel was developed through U. S. Steel's continuous research efforts to produce new and better products at the lowest possible cost. It is available in bars and semi-finished form and in plates from 3/16" through 1" thick inclusive, and in the full range of plate widths and lengths now available in USS "T-1" Steel. If extra hardness is needed, USS "T-1" Type A Steel can be furnished to a minimum Brinell hardness of 321.

For your copy of a properties card on USS "T-1" Type A Steel, write United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

USS and "T-1" are registered trademarks

SUGGESTED APPLICATIONS: Earthmoving and mining equipment, building construction, bridges, truck frames and bodies, missile transporters and launchers, oil field rigs and machinery transporters—wherever great strength, weldability, toughness, and resistance to impact abrasion are needed to build equipment stronger, lighter and more durable.

USS "T-1" Type A Steel Mechanical Properties and Chemistry

1. Produced in gages up to 1", inclusive.
2. Sold to the following chemistry: †

C	.12/.21	Cr	.40/.65
Mn	.70/1.00	Mo	.15/.25
P	.040 Max.*	V	.03/.08
S	.050 Max.*	B	.0005/.005
Si	.20/.35	Ti	.01/.03

3. Quenched and Tempered to meet the following mechanical properties:

	3/16" to ¾" incl.	Over ¾" to 1" incl.
Min. Yield Strength	100,000 psi	100,000 psi
Tensile Strength	115,000/135,000	115,000/135,000 psi
Elongation in 2"	18% min.	16% min.
Reduction of Area	40% min.	50% min.

4. Charpy impact values**
   15-foot-pounds at minus 50°F. based on longitudinal keyhole test.
5. This steel can also be produced to a min. BHN of 321, and when so produced, all other mechanical properties are waived.
6. Atmospheric corrosion resistance—at least two times that of structural carbon steel.

*When ordered to FBQ (Fire Box Quality) max. P is .035 and max. S is .040.

**Applies only to FBQ

†U. S. Patent No. 2858206

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Columbia-Geneva Steel—San Francisco
National Tube—Pittsburgh
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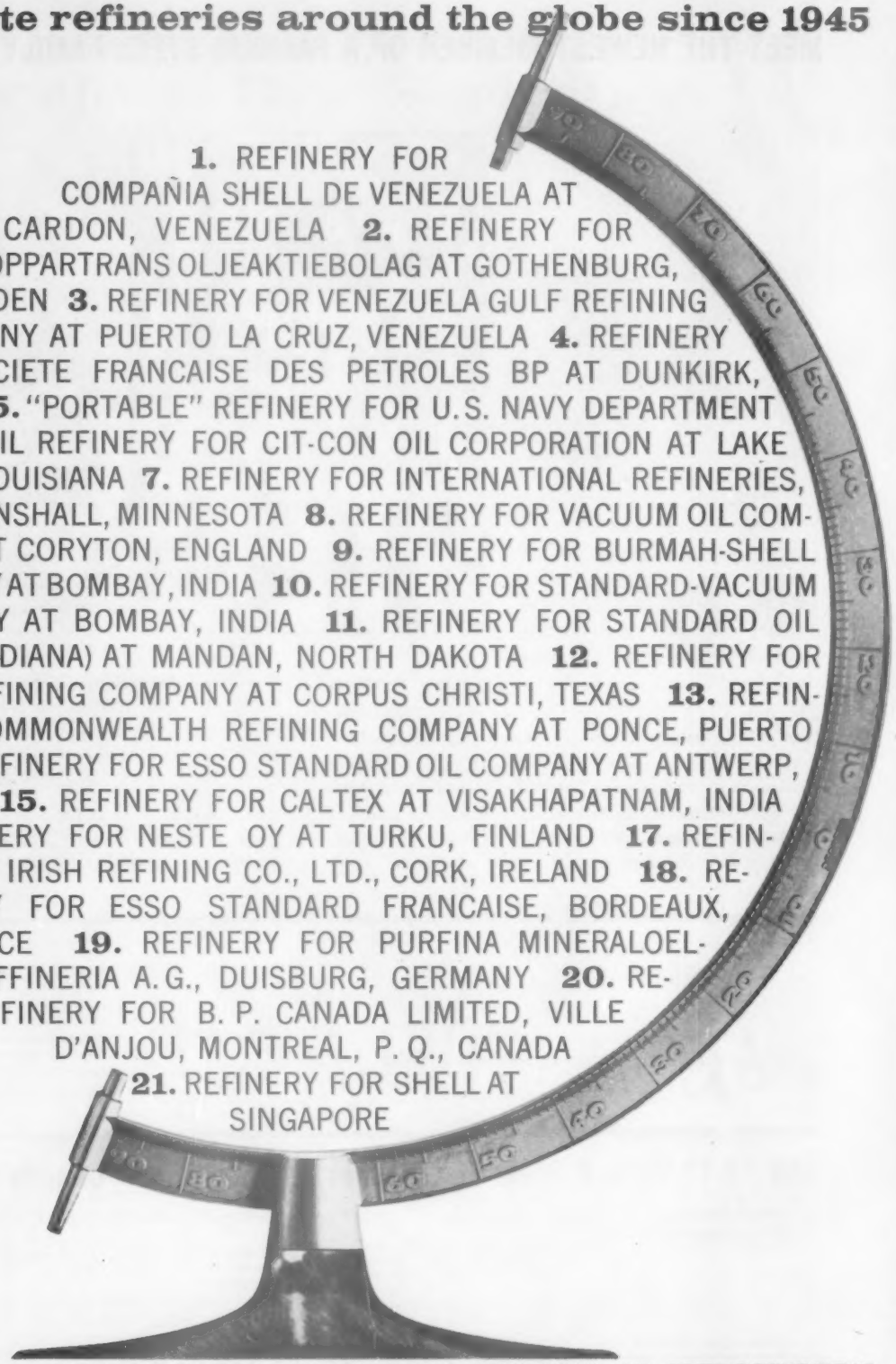
United States Steel

This mark tells you a product is made of modern, dependable Steel.

21 complete refineries around the globe since 1945



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Nash Compressors Tame "Hard-to-handle" Corrosive Gases

The reasons for the success of Nash Compressors in handling "dirty" and corrosive gases are simple. First, Nash Compressors have no internal parts in wearing contact, or requiring close tolerances and internal lubrication. Second, because of the Nash operating principle, a variety of liquids can be employed as the compressant medium, protecting the interior from corrosive action. Third, the pump casing may be fabricated from a variety of special metals and alloys. That is why Nash Compressors take these rugged jobs in stride.

Nash Vacuum Pumps offer the same basic advantages when handling corrosive gases, and reliably maintain vacuums up to 29.50 inches of mercury.

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CHLORINE
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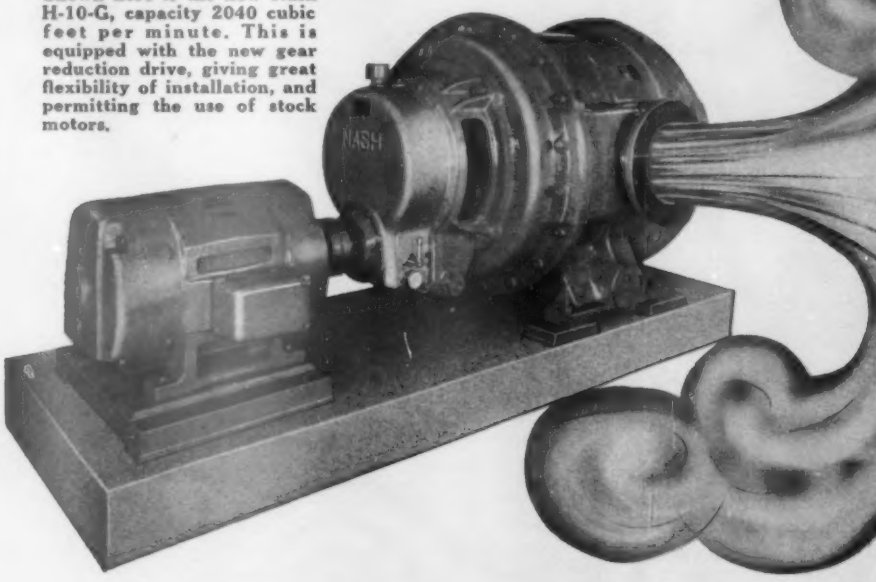
FLUE GAS
FURFURAL
HEXANE
HELIUM
HYDROGEN
HYDROGEN SULPHIDE
NITROGEN
OXYGEN
PHOSPHOROUS PENTOXIDE
SULPHUR GAS
VINYL ACETATE
VINYL CHLORIDE
AND MANY OTHERS

Shown here is the new Nash H-10-G, capacity 2040 cubic feet per minute. This is equipped with the new gear reduction drive, giving great flexibility of installation, and permitting the use of stock motors.



NASH ENGINEERING COMPANY

SOUTH NORWALK, CONNECTICUT, U. S. A.

Performance makes the world of difference

Fig. 6003—Steel gate valve for 600 W.P. Outside screw rising stem and yoke. Bolted flanged bonnet. Flanged ends.

Fig. 3061A—Steel horizontal swing check valve for 300 W.P. Heavily bolted flanged cap. Full unimpeded flow through when wide open.

Fig. 3058—Carbon steel, screwed end lubricated plug valve. ASA 300 pounds. Screwed gland type, wrench operated.

Fig. 2207G—Semi-steel, flanged end, lubricated plug valve for 200 pounds W.O.G. Bolted gland type. Worm gear operated.

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For 100 years Powell valves have served the vital lifelines of the oil industry. Today, the Powell line includes all types of steel, bronze, iron and corrosion resistant valves in sizes to meet every flow control requirement of the wide-spread petroleum world.

Powell can quickly supply all your valve needs and help solve your valve problems. Contact your nearby Powell distributor. (There's one in all major cities.) Or write directly to the Wm. Powell Company.

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Specify BOLTED STEEL TANKS

MASTER-CRAFTED BY COLUMBIAN SINCE 1893

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Specify Columbian Bolted Steel Tanks, and you get *all* of these top-priority advantages *plus* year-in year-out economy.

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We do contract steel fabrication

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Chris Well Servicing Co., Ltd.

"Equipment is vital to us—our continued growth depends on our ability to anticipate the future needs of our customers. We needed a self-propelled rig that would do slim hole drilling to a depth of 8,000 feet, and deep workover and deepening jobs down to 15,000 feet. The Cardwell KM250 filled the bill," says Mr. Sarratt. "We can bid on jobs the smaller rigs can't handle, and we can underbid heavier rigs by $50 to $100 a day. Moving and rig-up costs are low, and so is maintenance. We've had only one major repair in a year. The total time lost was only 12 hours, and Cardwell stood behind the rig 100%."

Chris Well deepened the Anderson-Prichard Oil Corporation's No. 1 Gray "A" from 10,832 feet to 12,032 feet—the first well to be deepened by a workover rig through the Bromide into the Oil Creek section. Savings to the operator were substantial—about $1,500 in moving and rigging-up costs, plus more than $50 per day on day rates. The KM250 actually outperformed a heavier rig—drilling the hole through a special technique in 18 days less than a conventional rig on an offset well, and making the 12,000-foot round trip in less time than the heavier rig, which was handling triples.

In view of records like these, it's easy to see why progressive contractors favor new Cardwells. Contact us to find out what a new Cardwell rig can do for your profits.

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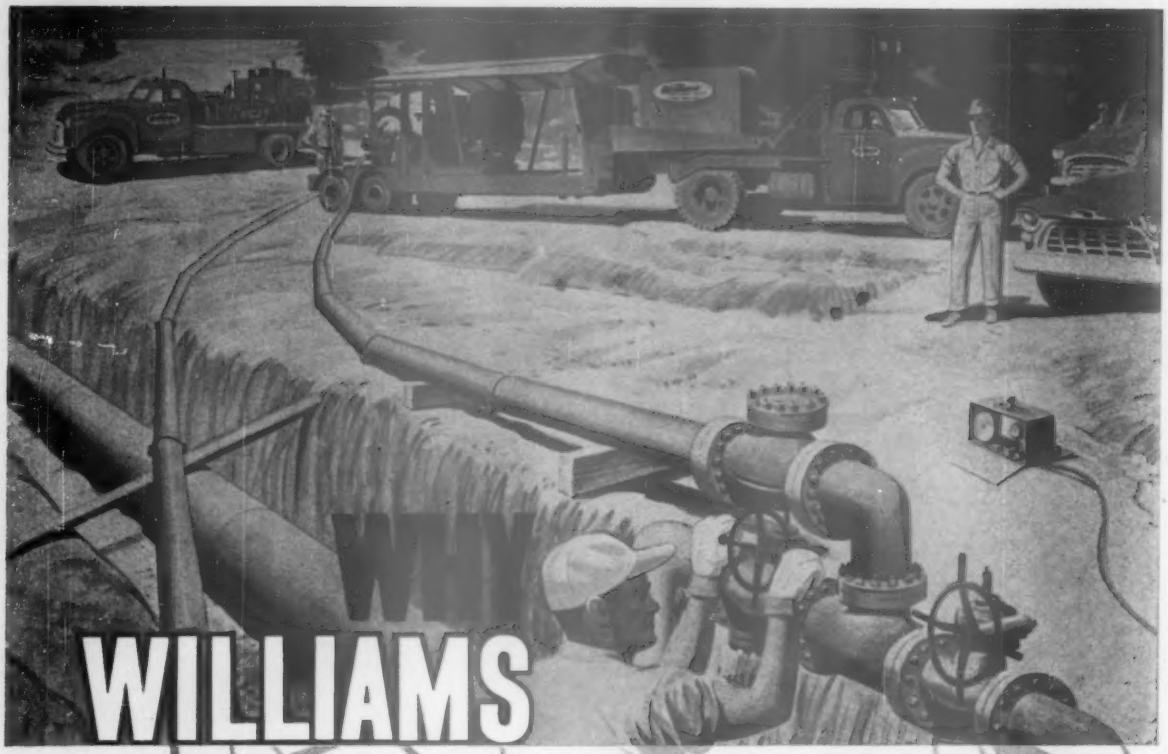

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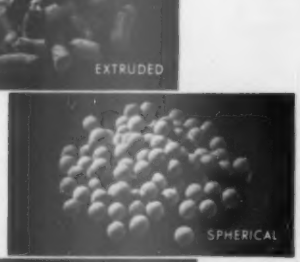
HARSHAW

typical

HARSHAW CATALYSTS

and how they are used



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CHROME-ALUMINA—available in powder or tablet form containing various percentages of chromium oxide supported on high surface area alumina—can be supplied as promoted catalyst and is also available as screened granules.

IRON—tableted iron oxide.

• REFORMING CATALYSTS

MOLYBDENA-ALUMINA—supported molybdenum oxide on alumina—available as microspheres for fluid techniques, or as tablets for fixed bed application.

NICKEL-ALUMINA—a spherical catalyst available as hard spheres measuring ¼″ to 1″ diameter—used for some types of gas reforming.

• DESULFURIZATION CATALYSTS

COBALT MOLYBDATE—a supported cobalt oxide—molybdenum oxide catalyst supplied in tablet form.

ZINC OXIDE—a pelleted zinc catalyst used in the desulfurization of natural gas.

MOLYBDENUM SULFIDE—powdered and tableted molybdenum sulfide.

• CHLORINATION CATALYST

COPPER—supported copper catalyst prepared and shipped as tablets or granules.

• HYDROGENATION CATALYSTS

NICKEL-KIESELGUHR—supplied as unreduced, or reduced and stabilized, tablets, ⅛″ to ⅜″ diameter.

NICKEL-ALUMINA—available in tablet form containing nickel as nickel oxide on high surface area alumina, or in spherical form supported on low area, high-fired alumina.

RUFERT FLAKES—reduced nickel protected by hardened oil shipped as free-flowing flakes for hydrogenation of all glyceride and acid fats.

COPPER-CHROMIUM OXIDE—shipped as powder or tablets, stabilized or non-stabilized, with varying ratios of copper oxide to chromium oxide.

NICKEL-ALUMINUM—powdered 50:50 alloy used for preparation of active nickel catalyst for low temperature hydrogenation.

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MERCURIC CHLORIDE—a granular catalyst consisting of mercuric chloride on active, granular carbon used in the synthesis of vinyl chloride monomer.

COBALT THORIA—available as powder or tablets, a thoria promoted cobalt catalyst employed in Fischer-Tropsch synthesis.

COBALT—a supported cobalt catalyst in pellet form used in the synthesis of hydrogen sulfide.

• DEHYDRATION CATALYST

ALUMINA—powdered and tableted aluminum oxide supplied as an active, intermediate surface area catalyst.

• CUSTOM CATALYST

Whether your requirement is measured in tons or pounds Harshaw can produce in confidence your catalyst exactly to your specifications of raw materials, chemical composition, and physical properties such as length, diameter, crushing strength, abrasion resistance, and bulk density. AND, make delivery when you want it. Call on Harshaw today—for further information or technical assistance.

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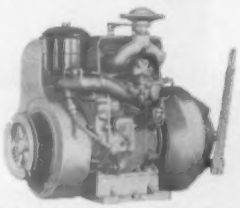
Protect yourself—power your utility units with Wisconsin Engines, 3 to 56 hp. Send for Service Directory S-198, and Engine Bulletin S-251.

Write to Harley Sales Co.

619 South Main Street, Tulsa, Oklahoma • 3420 McKinney Avenue, Houston, Texas • 805 South Main Street, Wichita, Kansas. Oil Field Distributors for Wisconsin Engines and all types of Utility Units.

SPECIAL ENGINE FOR OIL WELL PUMPING

The 2-cyl., 18-hp Model THPD is expressly designed for heavy-duty pumping of loads which change constantly and radically. Engine features a beefed-up flywheel which triples its high momentum factor (WR^2); positive rotators and Stellite exhaust valves and inserts; automatic high-temperature and low-oil-level safety switches, an oversize industrial dry-type clutch, and choice of fuel systems.



WISCONSIN
MOTOR CORPORATION
MILWAUKEE 46, WISCONSIN

World's Largest Builders of Heavy-Duty Air-Cooled Engines

J-3211

Do you check these points When Buying **STAINLESS STEEL** *Valves?*

- ☐ **How good are the castings?**
- ☐ **How precise is the machining?**
- ☐ **How rigid are the inspection and testing?**
- ☐ **How sound is the design?**

Just as important as a suitable stainless steel alloy are these four checks on valve quality. For long, dependable performance, a valve should rate *perfect* on every one.

There's a very good reason why you can be sure Jenkins Stainless Steel Valves will do that, unvaryingly:

For almost a century Jenkins has specialized in making valves. And making them to one standard of quality . . . the highest. Every operation and every worker is aimed at fulfilling that standard. The result is a product that can be backed by this 91-year-old assurance for valve users:

A Fair Offer

If you will put a Jenkins Valve, recommended for your particular service, on the worst place you can find . . . where you cannot keep other valves tight — and if it is not perfectly tight or it does not hold steam, oil, acids, water or other fluids longer than any other valve, you may return it and your money will be refunded.

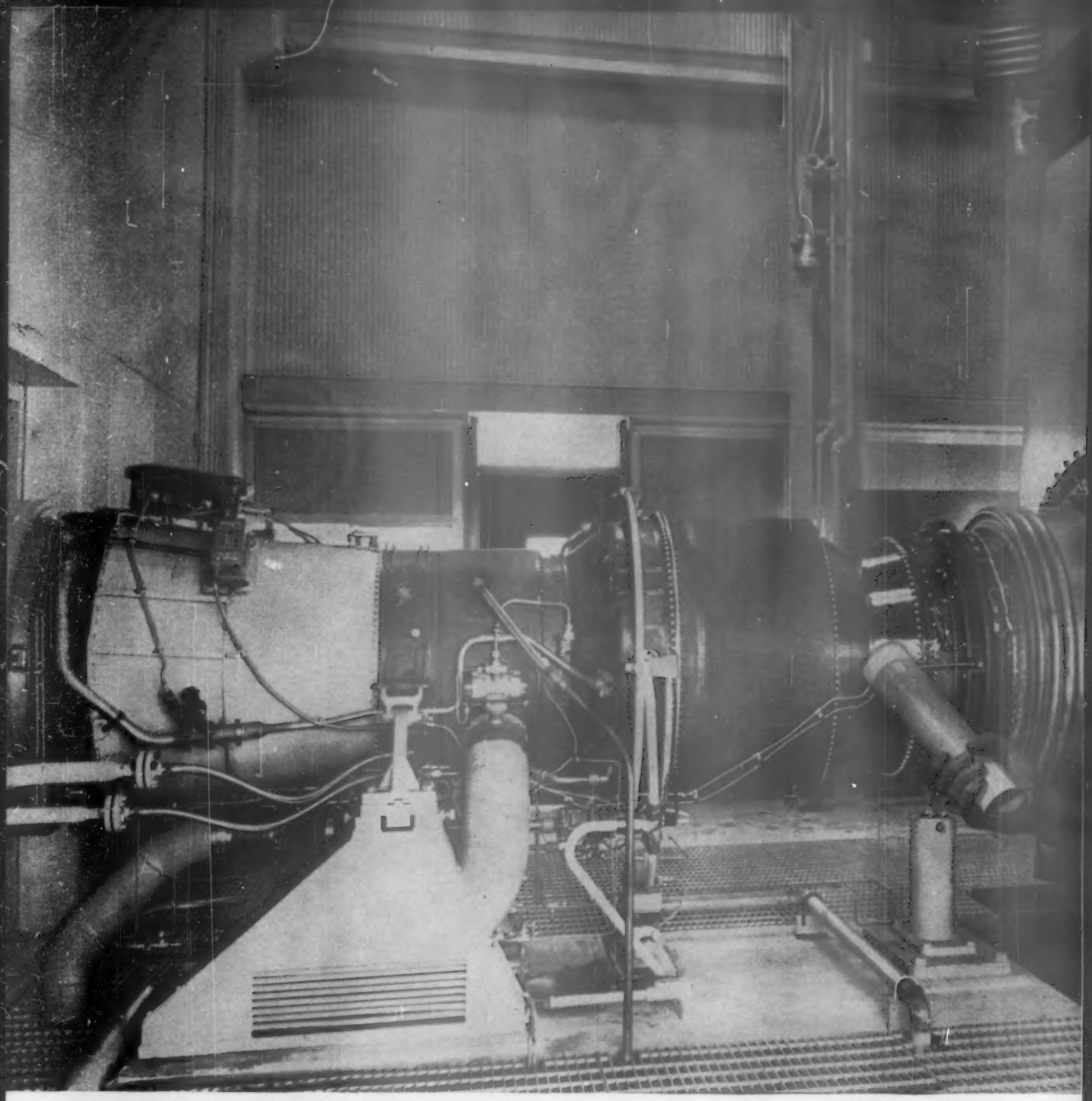
Order these reliable Jenkins Valves from your local Jenkins Distributor. Ask him or write us for Stainless Steel Catalog No. 59SS. Jenkins Bros., 100 Park Avenue, New York 17.

JENKINS VALVES

LOOK FOR THE JENKINS DIAMOND

JENKINS SINCE 1864 Jenkins Bros

Sold Through Leading Distributors Everywhere



R. L. Boyer, *Vice President and Director of Engineering, and* W. B. Boyum, *Manager of Gas Turbine Sales, The Cooper-Bessemer Corporation report . . .*

World's first jet powered gas turbine is now on the job

YOU are looking at a revolutionary new concept in industrial power. This Cooper-Bessemer 10,500 hp RT-248 gas turbine with a modified Pratt & Whitney Aircraft J-57 jet engine introduces new, drastic economies in plant construction, operation and maintenance. Shown here on the job at the Clementsville (Kentucky) Compressor Station of Columbia Gulf Transmission Company, this powerful, compact unit has taken on the total gas-boosting load of the station, operating 'round the clock. Find out how this outstanding joint development of Cooper-Bessemer and Pratt & Whitney Aircraft can fit into *your* plans for compressors, generators and other rotating machinery. Call our nearest office.

BRANCH OFFICES: Grove City • New York • Washington Gloucester • Pittsburgh • Detroit • Chicago • Minneapolis • St. Louis Kansas City • Tulsa • New Orleans • Shreveport • Houston Gregston • Dallas • Odessa • Pampa • Casper • Seattle San Francisco • Los Angeles • SUBSIDIARIES: Cooper-Bessemer of Canada, Ltd. . . . Edmonton • Calgary • Toronto • Halifax Stratford • C-B Southern, Inc. . . . Houston • Cooper-Bessemer International Corporation . . . New York • Caracas • Anaco • Cooper-Bessemer, S.A. . . . Chur, Switzerland • The Hague, Netherlands Mexico City • The Rotor Tool Company, Cleveland

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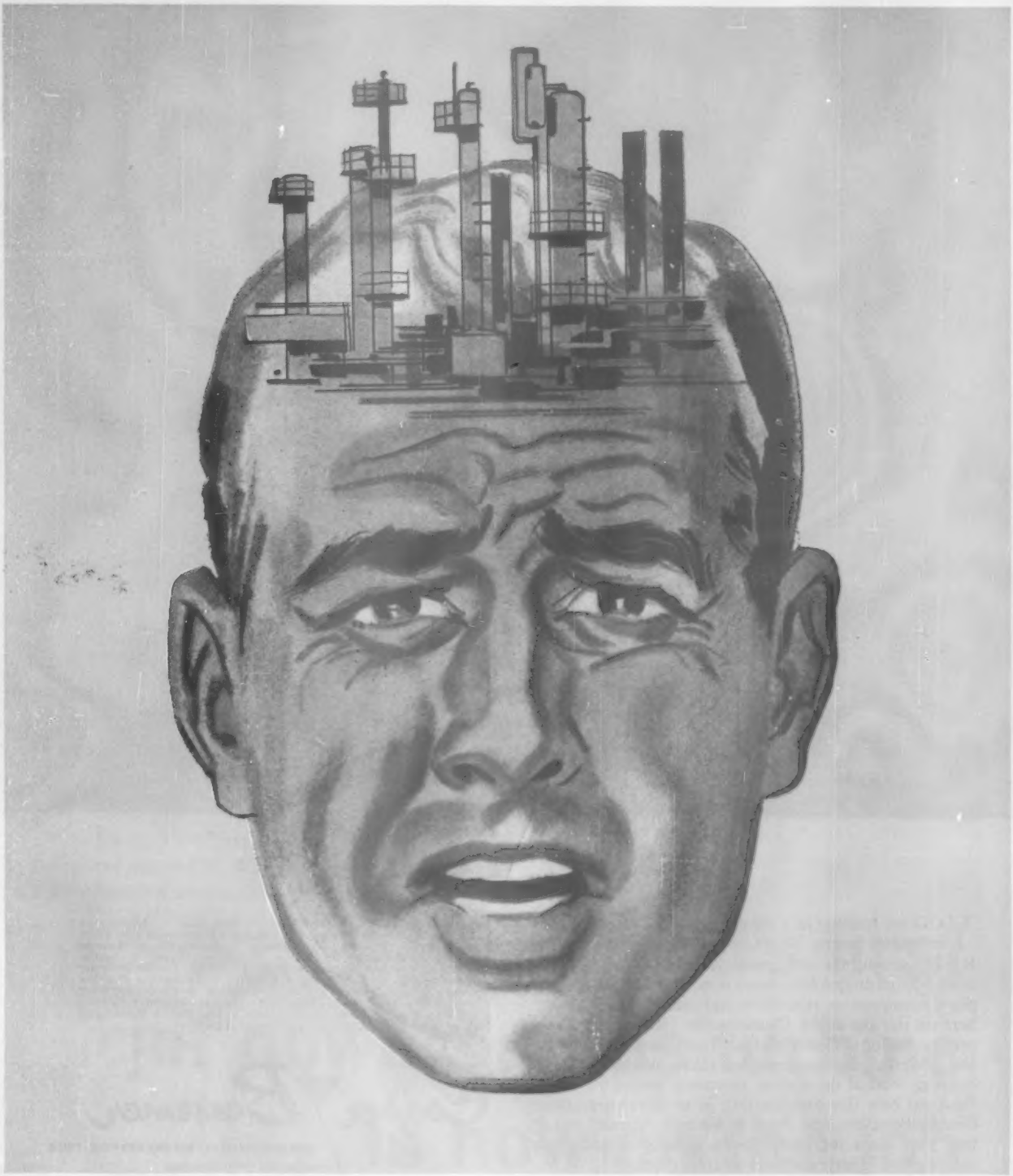
COMPRESSORS: RECIPROCATING AND CENTRIFUGAL, ENGINE, TURBINE OR MOTOR DRIVEN

Kellogg Cures Sulfur Headaches



with Low-Cost Hydrotreaters

KELLOGG-DESIGNED UNITS REDUCE CORROSION, INCREASE CATALYST LIFE AND SELECTIVITY, IMPROVE PRODUCT QUALITY WITH LESS TEL

With less low sulfur crude available today, and product specifications increasingly difficult to meet, a Kellogg hydrotreater is the refiner's answer to the many refining, storage and marketing problems presented by high sulfur-content feedstocks.

Working closely with the refiner's engineers, as it has done with those of leading oil companies throughout the United States—as well as in Canada, South America, Europe, Asia and Australia—Kellogg can design a unit that will remove harmful sulfur compounds to almost any degree desired, and also permit decrease of TEL.

Optimum investment and operating costs are also assured through designs that utilize selective pressures, reduce the use of costly alloys such as 18-8, and lower the consumption of high pressure hydrogen.

A Record in Desulfurization

To date, as shown at right, Kellogg has engineered and/or erected 17 reformer feed hydrotreaters—with a total capacity of over 161,000 BPSD, and 13 distillate hydrotreaters—with a total capacity of over 164,000 BPSD.

To acquaint you further with desulfurization by hydrotreating, Kellogg will gladly send you copies of a recent paper written by two of its engineers and reprinted from "Petro/Chem Engineer."

REFORMER FEED DESULFURIZERS

Heath, Ohio	3,000 BPSD
Houston, Texas	24,000 BPSD
Bakersfield, Cal.	4,000 BPSD
Kent, England	10,000 BPSD
Grand Prairie, Alberta	875 BPSD
Antwerp, Belgium	2,500 BPSD
Toledo, Ohio	22,000 BPSD
Ponca City, Okla.	16,000 BPSD
Dunkerque, France	10,000 BPSD
Lemont, Ill.	18,000 BPSD
Vancouver, B.C.	7,200 BPSD
Kwinana, Australia	10,000 BPSD
Montevideo, Uruguay	3,000 BPSD*
Concon, Chile	6,000 BPSD
Dinslaken, Germany	10,000 BPSD
Antwerp, Belgium	10,000 BPSD
Turkey	4,600 BPSD*

DISTILLATE DESULFURIZERS

Kwinana, Australia	5,600 BPSD
Port Arthur, Texas (2)	45,000 BPSD
Philadelphia, Pa. (2)	45,000 BPSD
Martigues, France	12,500 BPSD
Kent, England (2)	20,000 BPSD
Antwerp, Belgium	10,000 BPSD
Clarkson, Ont.	8,000 BPSD
Vancouver, B.C.	4,000 BPSD
Dinslaken, Germany	10,000 BPSD
Turkey	4,500 BPSD*

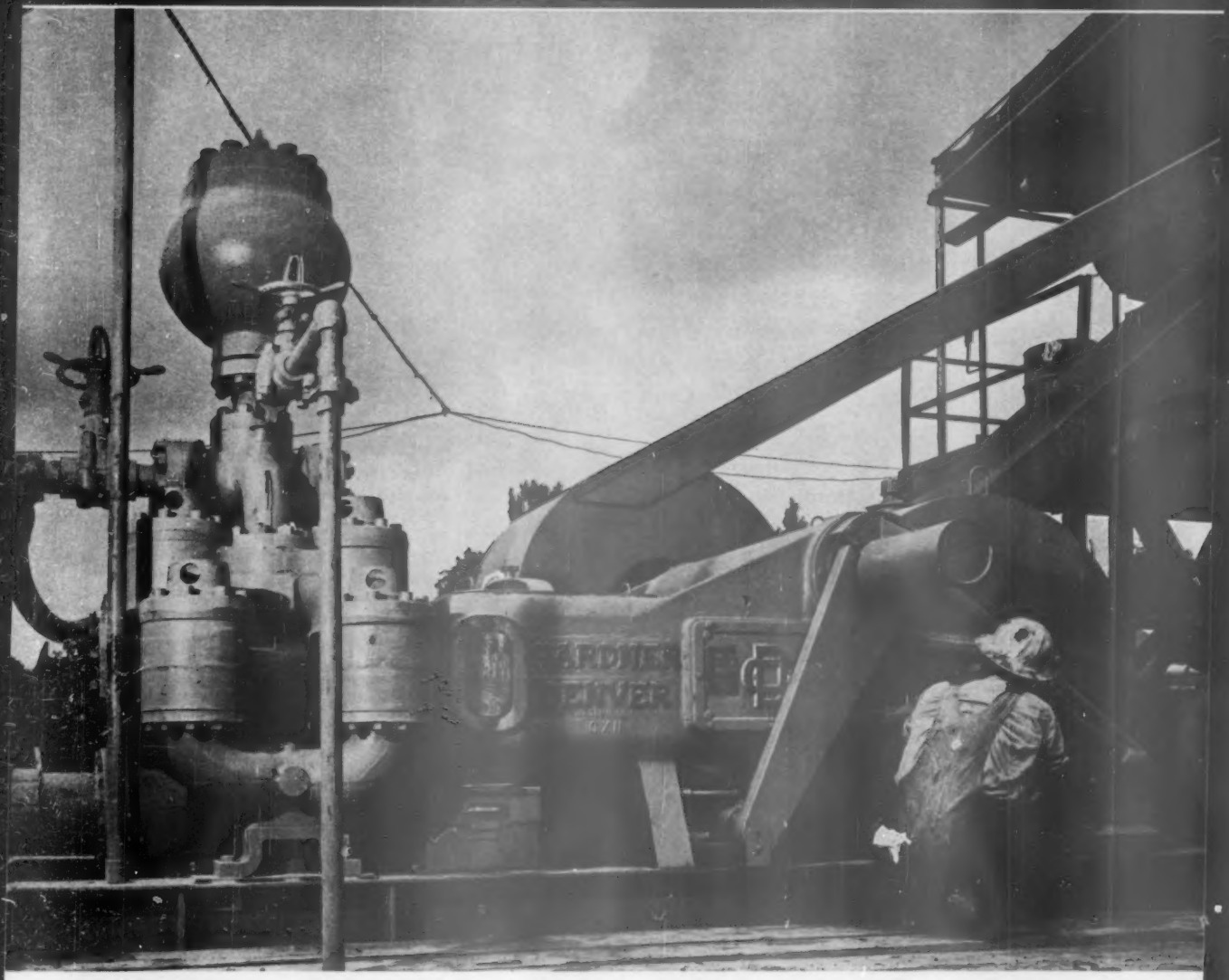
*Future

THE M. W. KELLOGG COMPANY
711 Third Ave., New York
A subsidiary of Pullman Incorporated

Offices of other Kellogg companies are in Toronto, London, Paris, Rio de Janeiro, Caracas, Buenos Aires

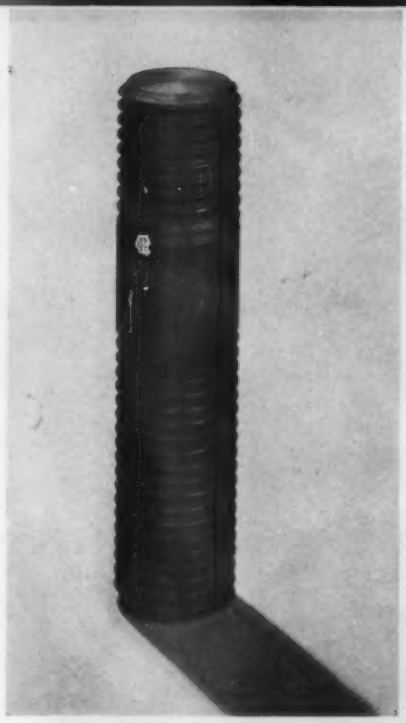
Gardner-Denver Mud Pump parts are easily replaced at the rig site. J&L Supply stores in the United States and Canada stock the parts. This is how to.....

Simplify



This GXN is one of two Gardner-Denver mud pumps in tandem arrangement on a wildcat in Louisiana. Gardner-Denver engineers designed these pumps for complete service in the field. And Gardner-Denver mud pump parts are as near as your J&L Supply store. Unitized, trailer-mounted, offshore—any rig with Gardner-Denver mud pumps is never handicapped for lack of experienced Gardner-Denver service or genuine Gardner-Denver parts.

Mud Pump Maintenance



SAFEGUARD AGAINST RIG BREAKDOWN.

There is a difference in valve cap studs. Gardner-Denver studs are machined from alloy steel and heat treated.

To avoid costly failures, damaged equipment, insist on genuine Gardner-Denver parts. Protect your investment in quality.

Ask your J&L Supply man for literature on Gardner-Denver mud pumps in sizes to 1250 h.p. for drilling to any depths.

Jones & Laughlin

SUPPLY DIVISION – Tulsa

If it's sold by J&L....It's the best available

113

New oil well control development from Cutler-Hammer

The Cutler-Hammer thermistor detects pump off, then signals transistorized relay which shuts off pump.

CONTROL

At last! An automatic pump off control that ends dry pumping!

- *Cutler-Hammer's exclusive pump off control for oil wells eliminates severe wear from dry pumping*
- *Cuts pumping time up to 25%, yet maintains maximum oil production . . . saves electricity, too*
- *Field tested for 2½ years . . . proved to lower oil lifting costs*

Now one of the biggest problems in oil well production is solved.

The new Cutler-Hammer Automatic Pump Off Control takes the guesswork out of figuring pump off time.

An ingenious sensing probe, (an electrically self-heated thermistor) measures fluid flow electrically. When the well pumps off, the thermistor signals the transistorized relay which in turn shuts off the pump. *Fluid flow* is the gauge—no other factors influence pump off.

You get maximum oil production without undue wear and maintenance. Even under rapidly changing well characteristics the pump off control matches pumping schedules to well production—a real aid to pumpers.

By preventing just one pump overhaul you save enough to pay for a half dozen or more Cutler-Hammer pump off controls. You can't afford to be without them. This unique control is easily installed with any size pump. Better get Pub. LO-16—A275 now for full details.

What's new? This new, *better* product is a typical example of what you can expect from the new Cutler-Hammer. We've added new plants, new engineering talent, even a new trademark that symbolizes our new capabilities for the demanding decade ahead. Find out more about our new problem-solving capabilities soon.

WHAT'S NEW? ASK...

CUTLER-HAMMER

CONTROL

Cutler-Hammer, Inc., Milwaukee, Wis. • Division: Airborne Instruments Laboratory • Subsidiary: Cutler-Hammer International, C.A. • Associates: Canadian Cutler-Hammer, Ltd.; Cutler-Hammer, Mexicana, S.A.

"A great step forward with your Planetary Gears, Big Bearings and Cylindrical Crossheads."

— J. K. Butler

WHELAND PLANETARY
HP-16000 PUMP
Duplex Power Slush Pump
7¾" x 16", 600 H.P. at 65 RPM

OIL PRODUCTION MAINTENANCE, INC.
7440 CHOCOLATE BAYOU ROAD -- P. O. BOX 14291
HOUSTON 21, TEXAS
August 31, 1960

Mr. Gordon P. Street, President
The Wheland Company
Chattanooga, Tennessee

Dear Mr. Street:

Our Wheland Planetary Pump is giving us increased penetration and good savings on bits. We know from more than 18 months of constant operation on 10,000 Ft. wells that our savings are substantial.

We have kept an accurate record on operating costs and all maintenance costs and are especially impressed by the low cost of fluid end expendables. The HP-16000 Pump has constantly operated near its rated capacity on more than 200,000 feet of hole in the Texas Gulf Coast Area.

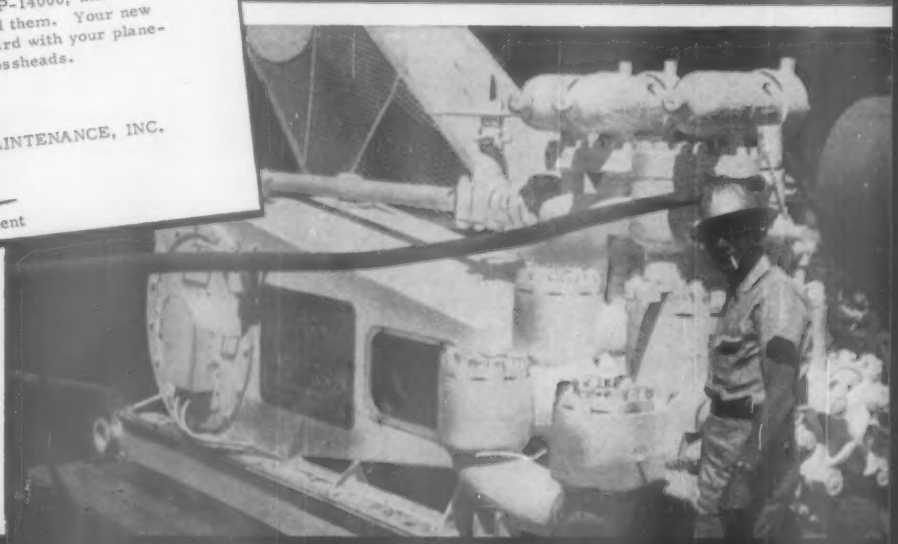
We are now operating Wheland HP-18000, HP-14000, and HP-16000 Pumps and are glad to recommend them. Your new HP-16000 Pump design is a great step forward with your planetary gears, big bearings and cylindrical crossheads.

Yours very truly,

OIL PRODUCTION MAINTENANCE, INC.

J. K. Butler

J. K. Butler, President



Wheland HP-16000 Planetary Pump owned by Oil Production Maintenance, Inc., on location in the Gulf Coast area.

WHELAND

ROTARY DRILLING MACHINERY

THE WHELAND COMPANY
CHATTANOOGA, TENNESSEE, U.S.A.

DRAW WORKS • SLUSH PUMPS • ROTARIES
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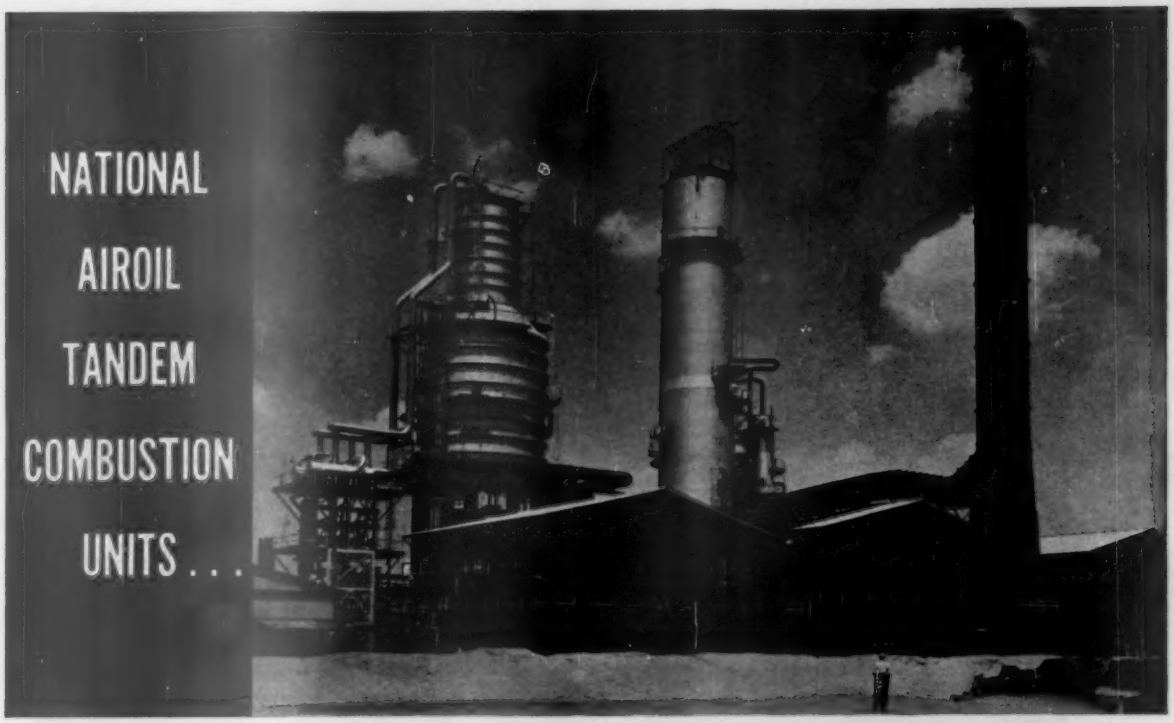
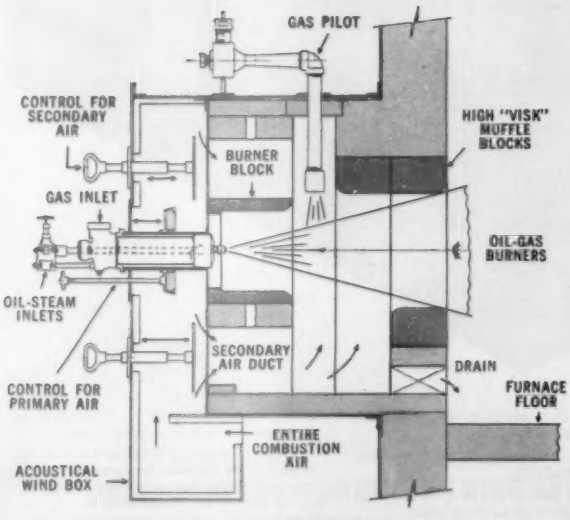
DOMESTIC DISTRIBUTORS: INDUSTRIAL SUPPLY COMPANY, INC.—Main Office: Wichita Falls, Texas • HOUSTON OIL FIELD MATERIAL COMPANY, INC.—Main Office: Houston, Texas.

EXPORT DISTRIBUTORS: LUCEY EXPORT CORPORATION—233 Broadway, New York 7, New York—Broad Street House, London, E. C. 2, England.



Help Improve Performance of Nation's Largest Crude Still



R-9972

The nation's largest crude still—140,000 barrels per day rated capacity with ample reserve—is equipped with National Airoil improved Combination Oil and Gas Tandem Combustion Units . . . for *better* service and *improved* performance.

The oil fuel is high viscosity uncut vacuum tower bottoms, supplied to the burner at high temperature. The gas is refinery type at only medium pressure.

The burner design details emphasize a maximum of heat transfer by flame radiation with a high turn-down ratio.

Combustion noise has been minimized, on both primary and secondary air, by means of the acoustical wind-box which also serves as a "wind break."

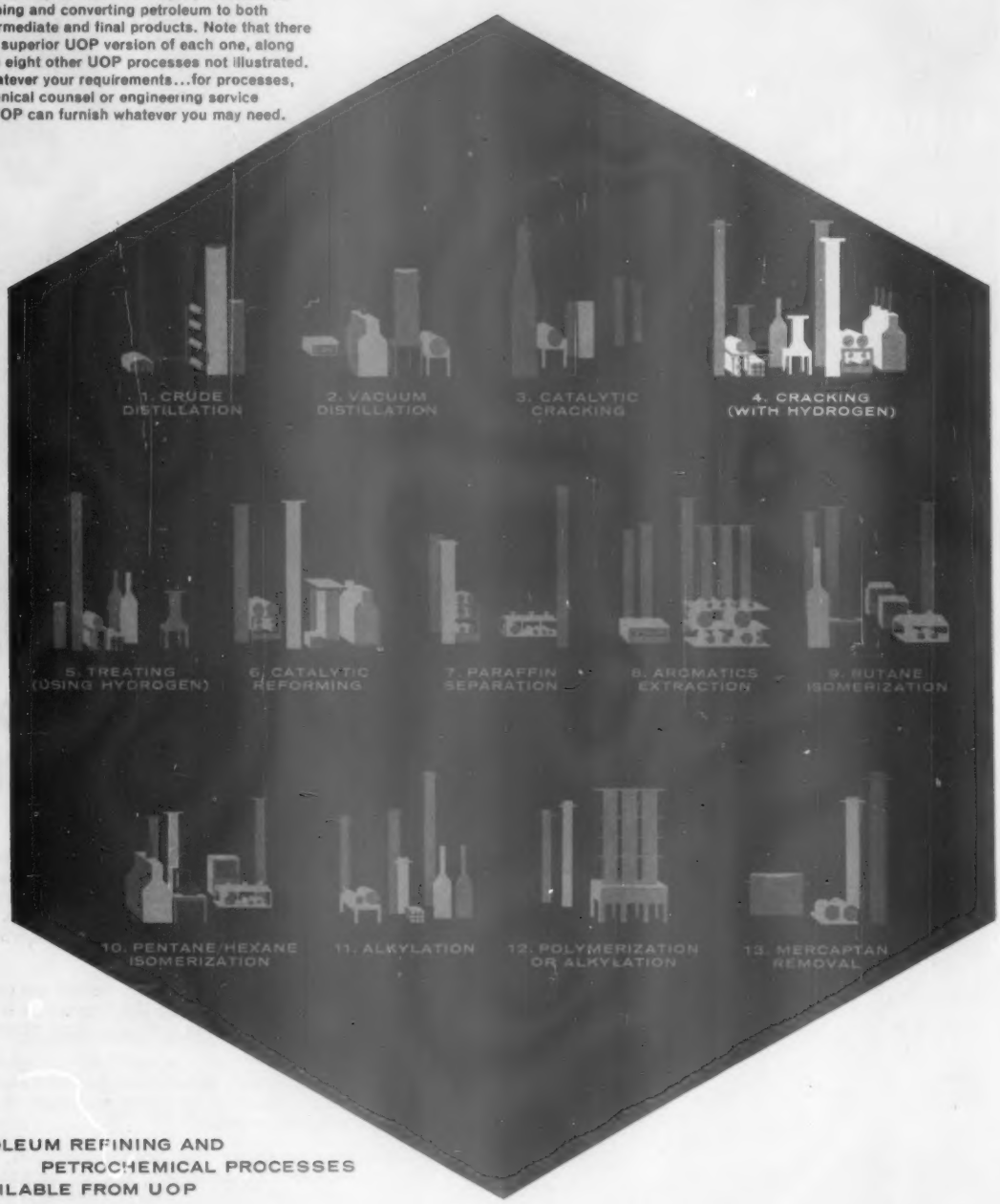
Perhaps a National Airoil Combination Oil and Gas Tandem Combustion Unit can help improve performance at your installation. A discussion of your problem entails no obligation whatever. Write today.

NATIONAL AIROIL BURNER

Established 1912
Incorporated 1917

NATIONAL AIROIL BURNER COMPANY, INC.
1284 E. Sedgley Avenue • Philadelphia 34, Pa., U.S.A.
Industrial Oil Burners, Gas Burners and Combustion Equipment

Here are symbolized the major processes for refining and converting petroleum to both intermediate and final products. Note that there is a superior UOP version of each one, along with eight other UOP processes not illustrated. Whatever your requirements...for processes, technical counsel or engineering service ...UOP can furnish whatever you may need.



PETROLEUM REFINING AND PETROCHEMICAL PROCESSES AVAILABLE FROM UOP

1. **CRUDE DISTILLATION** equipment is designed and engineered by UOP in any desired capacity.

2. **VACUUM DISTILLATION** and **VISBREAKING**—easy-to-operate processes for preparation of feed stocks for catalytic cracking.

3. **FLUID CATALYTIC CRACKING**—an improved process that gives higher yields, higher octane numbers.

4. **LOMAX™**—highly flexible process that converts middle distillates and vacuum gas oils into gasolines and distillate fuels of outstanding quality.

5. **UNIFINING™**—a modern process that completely purifies petroleum distillates.

6. **PLATFORMING®** produces high octane gasolines, high purity aromatics.

7. **MOLEX™**—a new continuous separating process that removes lowest-grade hydrocarbons from gasoline.

8. **UDEX®**—the ideal process for separation of super-purity aromatics.

9. **BUTAMER™**—a new and practical process for producing isobutane.

10. **PENEX®**—a new process that converts light, normal paraffins to isoparaffins.

11. **HF ALKYLATION**—makes alkylate, top anti-rumble motor fuel. Sulfuric acid process also available.

12. **CATALYTIC CONDENSATION**—converts olefin fractions of refinery gases into high-quality gasoline and petrochemicals.

13. **MEROX™**—a new and inexpensive treating process to remove mercaptans from gasolines and light distillates.

PROCESSES NOT ILLUSTRATED:

REXFORMING®—the ideal process to insure your top octane position.

CATALYTIC DEHYDROGENATION—removes hydrogen from hydrocarbons to produce less-saturated hydrocarbons.

HYDEAL™—a new process for the hydrodealkylation of toluene or C_9 aromatics to produce benzene; may also be used for manufacturing phenol and naphthalene.

HYDRAR™—converts benzene to cyclohexane with excellent yields, achieves extreme high purity with Udex grade benzene.

OLEFIN EXTRACTION—efficiently separates olefins and diolefins from paraffins; prepares olefins for further conversion.

AROSORB™—removes heavier aromatics from synthetic and natural distillates, produces aromatic-free heavier distillates.

ALKAR™—produces ethylbenzene, cumene and other alkylated aromatics from Fluid Cat Cracker off-gas streams.

UNISOL®—an economical process for treating high mercaptan-containing gasolines.

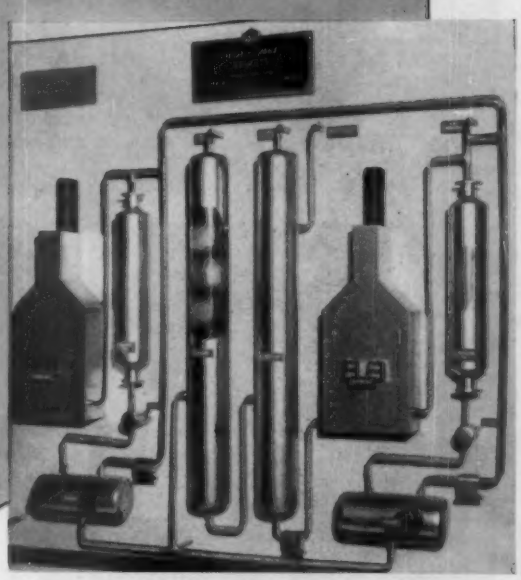
'62 COULD BE
THE YEAR
FOR YOU!

how to make products your customers want to buy...

Described below is the new and versatile UOP process . . . LOMAX. A remarkable and ultra-flexible cracking-with-hydrogen process, LOMAX enables the refiner to reach a new high in operating flexibility. He can convert his middle distillates into the most *immediately saleable* ratio of gasoline and distillate fuels . . . and change his ratio to fit the changing needs of his market.

With UOP processes the refiner can accomplish just about anything that comes within the realm of practical petroleum refining technology. Take a look at the brief descriptions on the opposite page, and you'll agree. And remember, in many cases existing equipment can be revamped and expanded, and thereby will produce more saleable products.

*INFORMED OPINION indicates that 1962 will require a substantial increase in process capacity ...NOW is the time to start your planning! Ask us about a preliminary proposal...no obligation!



LOMAX™ With this new and highly flexible UOP process, model of which is shown above, the refiner is able to increase production of his most currently saleable product on a year-'round basis. Through the catalyzed reaction of oil with hydrogen, LOMAX converts middle distillates ranging from kerosines to heavy gas oils into a wide ratio of gasoline or distillate fuels.

As seasonal demands change, LOMAX production of these products is adjusted accordingly.

Important additional benefits afforded by LOMAX include distillates of exceptionally high purity (even from sour crudes) . . . predominance of branched isomers in light hydrocarbons . . . greatly reduced quantities of light gases . . . olefin-free products . . . long catalyst life . . . and other advantages.

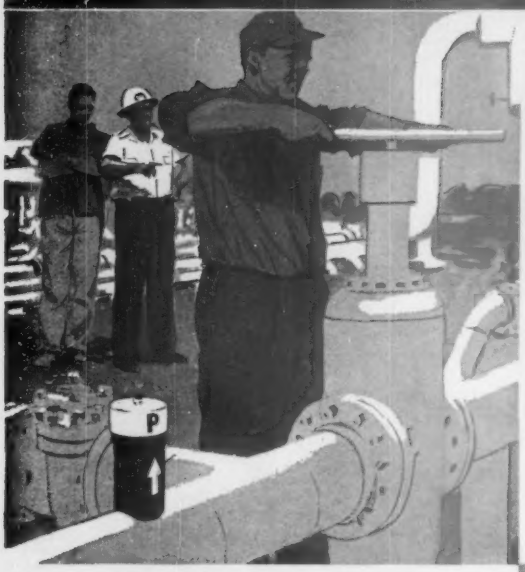
LOMAX may be used to supplement existing facilities, or as a basic cracking operation in a new installation.

UOP

UNIVERSAL OIL PRODUCTS COMPANY
30 Algonquin Road, Des Plaines, Illinois, U.S.A.

WHERE RESEARCH TODAY MEANS PROGRESS TOMORROW

NEWS FROM DOWN THE LINE!

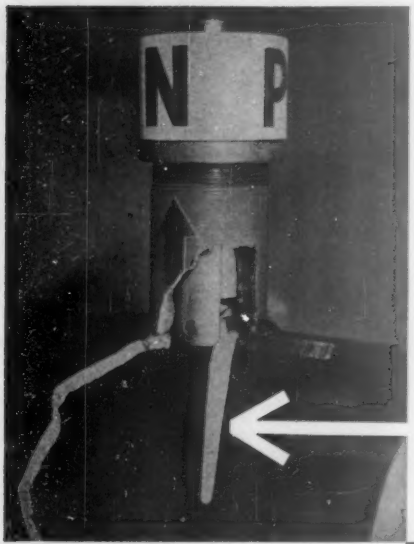


NEW WmSON "PIG-SIG II" CAN BE INSTALLED OR REMOVED UNDER PRESSURE!

❷ "The Pig-Sig II with the Electrical Indicator can signal arrival of pig to pump station operator or start operation of automatic equipment to open and close valves."

❶ "The station operator knows the pig has arrived because the Pig-Sig II visual indicator is in the "passed" position. He no longer needs to wait and listen at the scraper trap."

❹ "This completely new Pig-Sig II uses a standard 2" Thread-O-Ring Nipple. Easily installed under pressure with WmSon Tapping Machines, using a standard drill. The Pig-Sig II is available with either an electrical or visual signal, extended or regular."



❸ "This new, improved long trigger action detects scrapers even in oversize pipe. Pig-Sig II is excellent for use in metering or calibration."

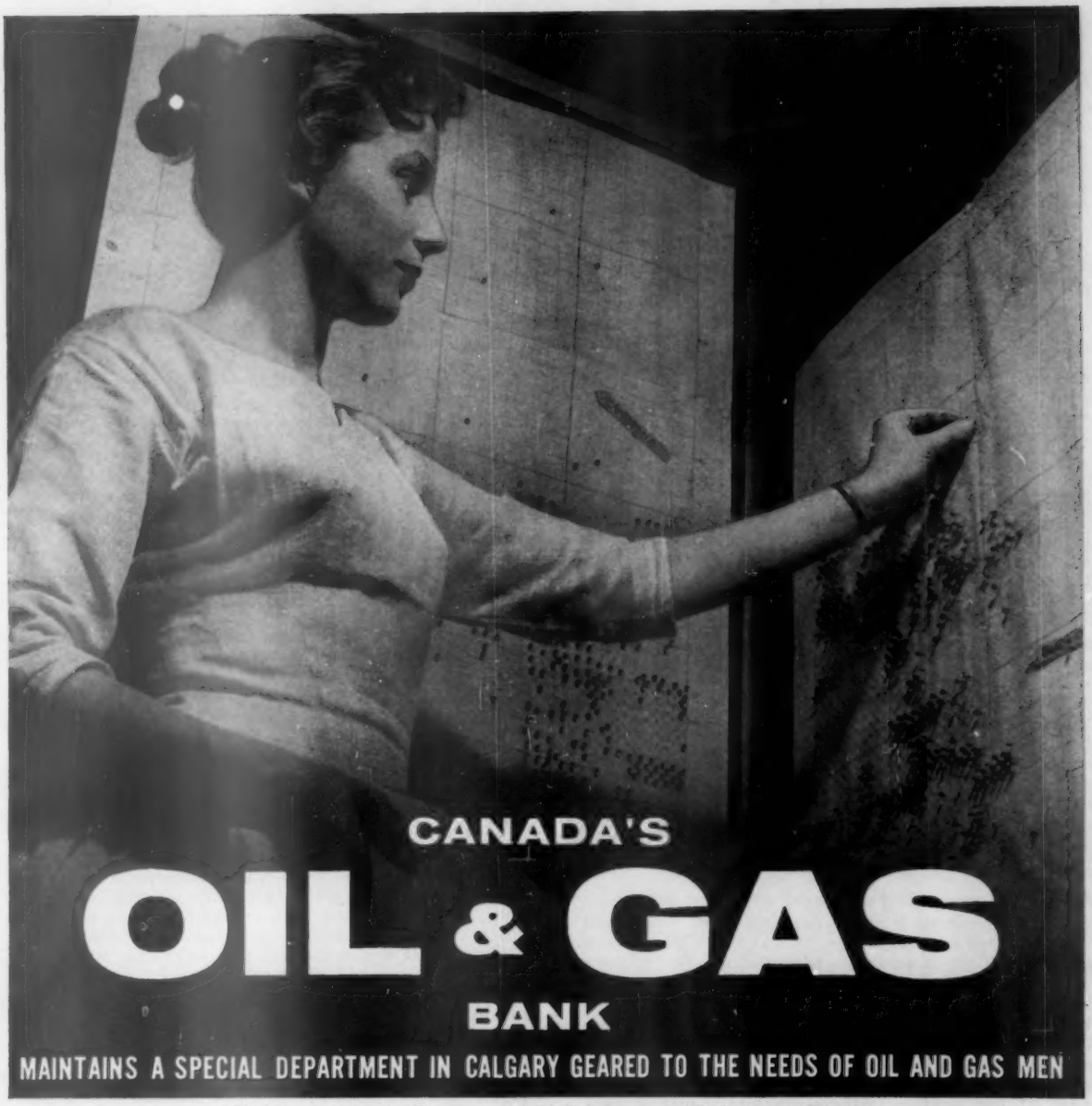
"Pig-Sig II" Patent applied for

● Write Dept. A for Bulletin A-199

T.D. Williamson, Inc.

P. O. BOX 40 • TULSA 2, OKLAHOMA

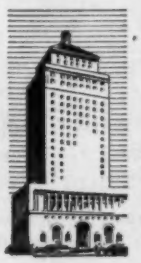
REPRESENTATIVES AROUND THE WORLD



Oil & Gas Department well maps are posted daily to keep pace with changing conditions.

The officers who staff our Oil and Gas Department in Calgary are "oil bankers" in every sense. By experience and training they are exceptionally well qualified to facilitate and coordinate the many services called for by this fast growing Canadian industry.

Among other facilities, this department offers special bulletins designed to provide



up-to-date information on regulations, tariffs, financing, basic statistics and kindred subjects. For a list of the latest available Oil and Gas Bulletins, write to our Dallas representative, Mr. H. E. McClenaghan, Room 1523, 300 North Ervay St., Dallas 1, Texas; or to The Royal Bank of Canada, Oil and Gas Dept., 409 Eighth Ave. W., Calgary, Alta.

We do not provide information on oil securities.

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Canada's Largest Bank • Fourth in North America

Head Office: Montreal • New York Agency: 68 William St., New York 5, N. Y. • Dallas Representative: H. E. McClenaghan, Room 1523, 300 N. Ervay St.
Assets exceed 4 billion dollars • Over 1,000 Branches in Canada, the Caribbean Area and South America • Offices in New York, London and Paris

CONTACTOR

GLYCOL PROCESS DESIGN AND OPERATING INFORMATION

Proper use of glycols in well designed, correctly operated equipment is essential for efficient gas treating. Some of these important design and operating considerations will be discussed in this series.

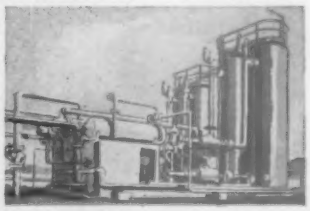
Glycol Injection Units

Units discussed in this issue of Allied Chemical Contactor are those using glycols to prevent hydrate formation when low temperatures are used to increase recovery of liquifiable hydrocarbons.

Type of Glycol for Use

Either ethylene or diethylene glycol may be used in glycol injection recovery units. Triethylene glycol is *not* recommended because of its high solubility in liquid hydrocarbons.

Both ethylene and diethylene glycol offer certain advantages depending on desired characteristics. Ethylene glycol has a higher vapor pressure, which means a greater vapor loss . . . yet it has a lower solubility in liquid hydrocarbons. Thus, losses are essentially equal for both chemicals. Ethylene glycol is less viscous than diethylene glycol, and its eutectic mixture with water has a lower freezing point than does the diethylene glycol eutectic.



Separation of Glycol and Hydrocarbon

Optimum temperature for separation of glycol and hydrocarbons is in the range of 40-60° F. High losses can occur if the streams are heated above 100° F prior to separation. At the other extreme – temperatures below 20° F – it is very difficult to separate glycol and hydrocarbon streams because they are practically insoluble. Entrainment of the glycol in the exit hydrocarbon stream will cause high losses of glycol. If it *is* mandatory to separate at low temperatures, long residence times or very efficient agglomerating separators should be used.

Amount of Glycol to Inject

To prevent hydrate formation, it is possible to inject as little as one-half gallon per hour per mmcfd; for greater dehydration, most operators prefer to inject one gallon of glycol per hour per mmcfd.

Mechanics of Injection

Use of spray nozzles for atomization of the glycol when it is introduced into the natural gas is recommended. Operating experience has shown that several joints of pipe will effect a very thorough mixing of glycol and gas, provided flow is in the turbulent region.

Care should be taken to prevent layering of glycol where the chiller is of the shell and tube type. Assure complete mixing of the glycol in the gas.

Care of Glycol

Like any process, good operation dictates that proper care be taken of the glycol used for hydrate inhibition. Frequent checks on the pH of the glycol should be made. Practically all of the degradation products of glycols are acids, being predominantly formic and acetic acid; and though none have been reported, it seems likely that dibasic acids could be produced by degeneration. If the pH of a glycol unit is not carefully watched the solution can become very acidic which will cause the solution to be corrosive. A buffer should be employed that will keep the pH at 7.2.

A black gum very often forms in glycol units. The presence of hydrocarbons seems to speed the rate of formation of this material, and hydrocarbons may be a reactant. The formation almost always occurs at a low pH and could be an ester (or even possibly a polyester). This material when deposited is very hard and brittle, but exists in the glycol as a very fine suspension. We believe that the removal and control of this material is essential to proper glycol unit operation.

In most of these systems a very convenient buffer is monoethanolamine. MEA is a fairly strong base and will yield soluble salts with the acids formed in these units. Another reason for the use of MEA is that it is a film former and will serve as a corrosion inhibitor. Care should be exercised when using MEA in this manner so that too much is not used. At a pH of around 8.5, a solution of glycol and MEA may foam very badly.

Another important step to be taken in the care of glycol solutions is the proper filtration of the solution. As mentioned, an accumulation of gum and silt in a glycol solution is an invitation to trouble. Glycol is a very difficult material to filter and one possible way might be to use a self cleaning type filter in combination with a packed filter. Longer and more complete operation would be obtained in this manner.

FOR MORE INFORMATION, look for future issues of Allied Chemical Contactor featuring articles on ethanolamines and glycols in gas treating operations.

We will gladly send technical data, delivery and price information on Allied Chemical Ethanolamines and Ethylene Glycols.

For specifications and local offices, see our insert in Chemical Materials Catalog, pages 475-482 and in Chemical Week Buyers Guide, pages 37-44.

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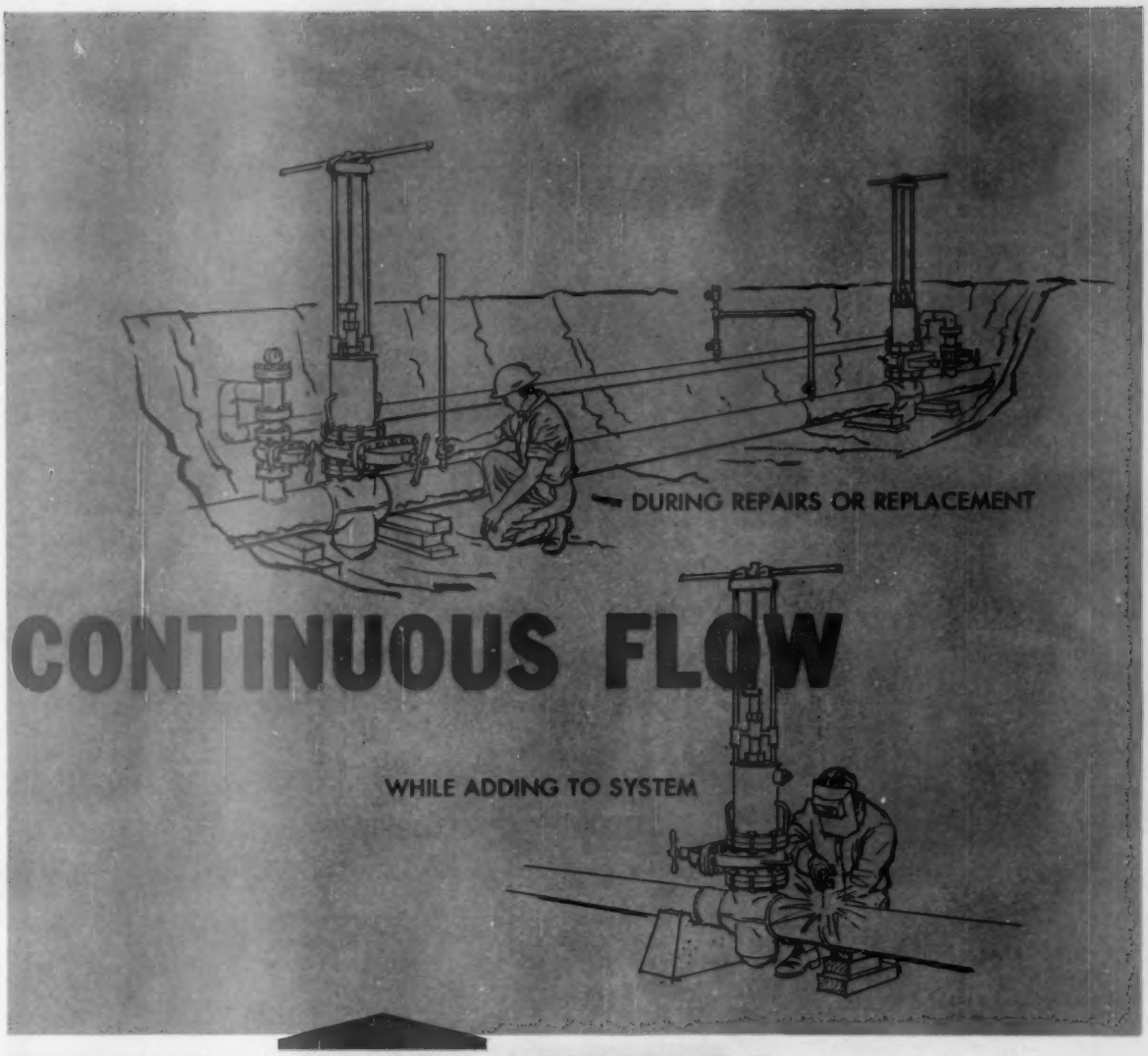

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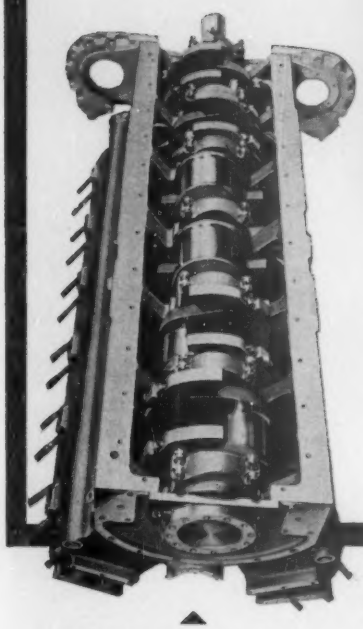
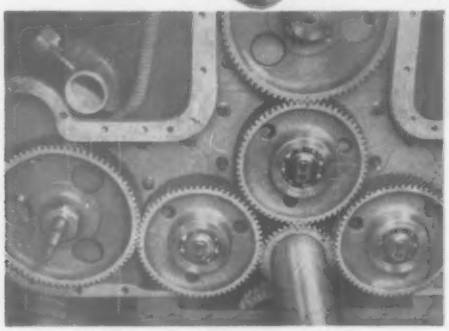


Crankshaft and main bearings in place in a typical Waukesha V-12 oil field engine. Note heavy flanges, thick bearing webs, rugged long-life construction.

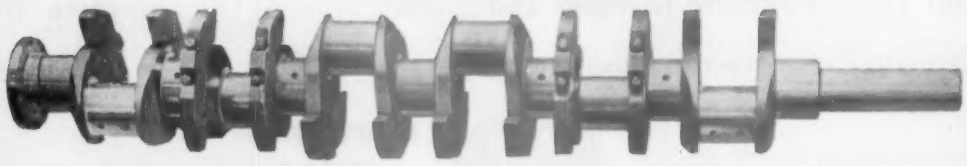
Precision-built and balanced rod assemblies, matched with pistons. Pressure oiled, mirror smooth, heavy pins. Replaceable bearing shells.

Removable wet cylinder sleeves of close-grained alloy iron, finished for oil retention and long life. Heavy duty, aluminum alloy, oil-cooled pistons.



Wide-faced helical cut timing gears are flood oiled. Materials selected for long, quiet life and accuracy. Gears and all elements in the power train, from pistons to flywheel, are precision-machined in Waukesha shops under Waukesha Quality Control.

Rifle-drilled, drop-forged, heat-treated crankshafts, precision-ground to exacting Quality Control standards. Note extra large bearing areas. Statically and dynamically balanced.



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another
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report

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TPR 60-2

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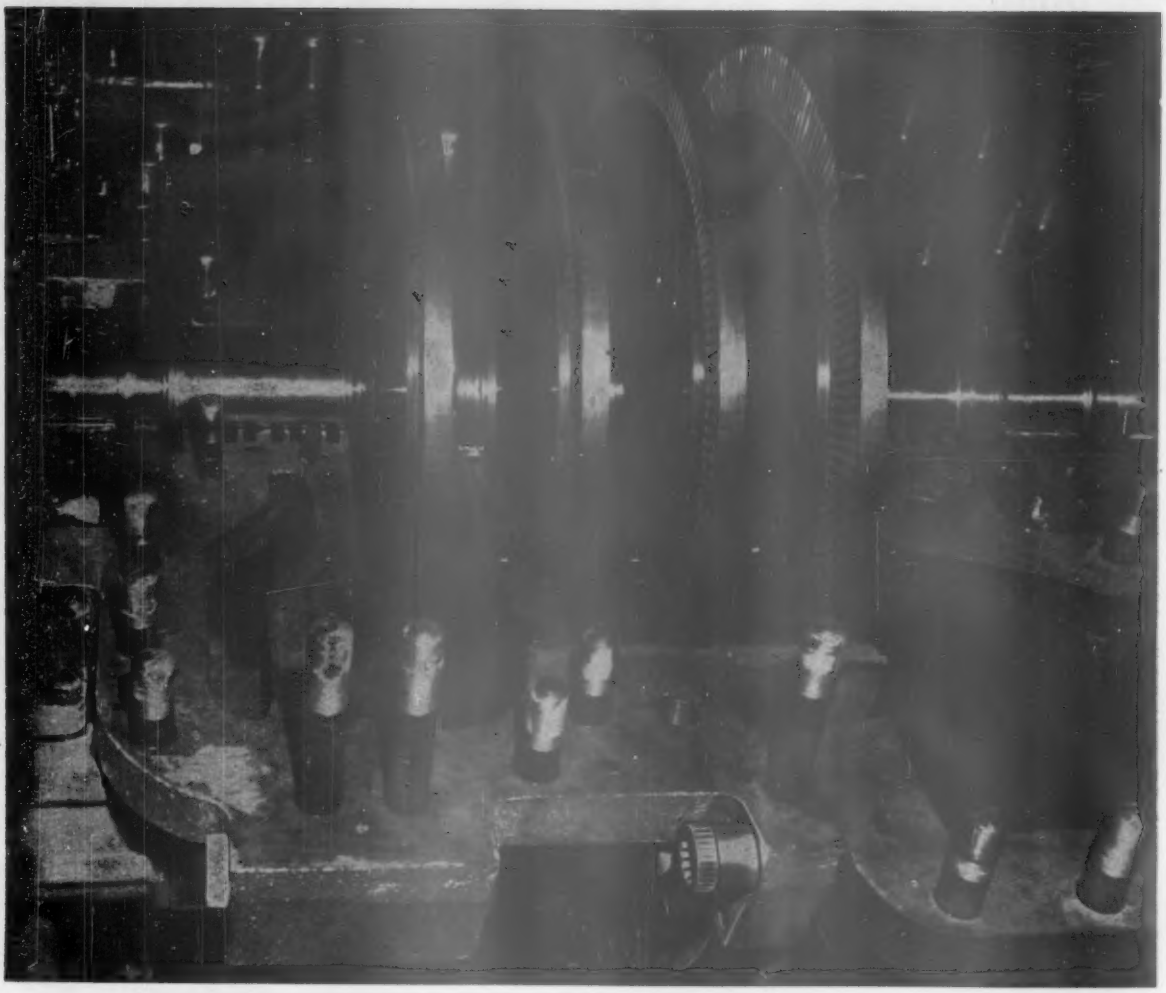

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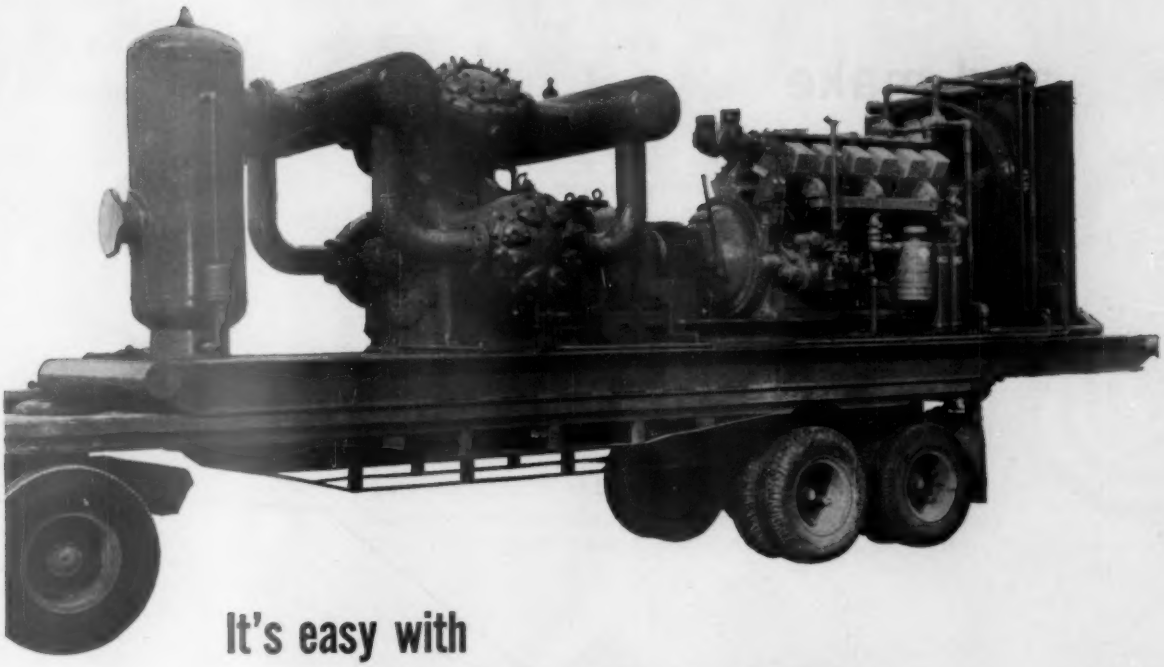

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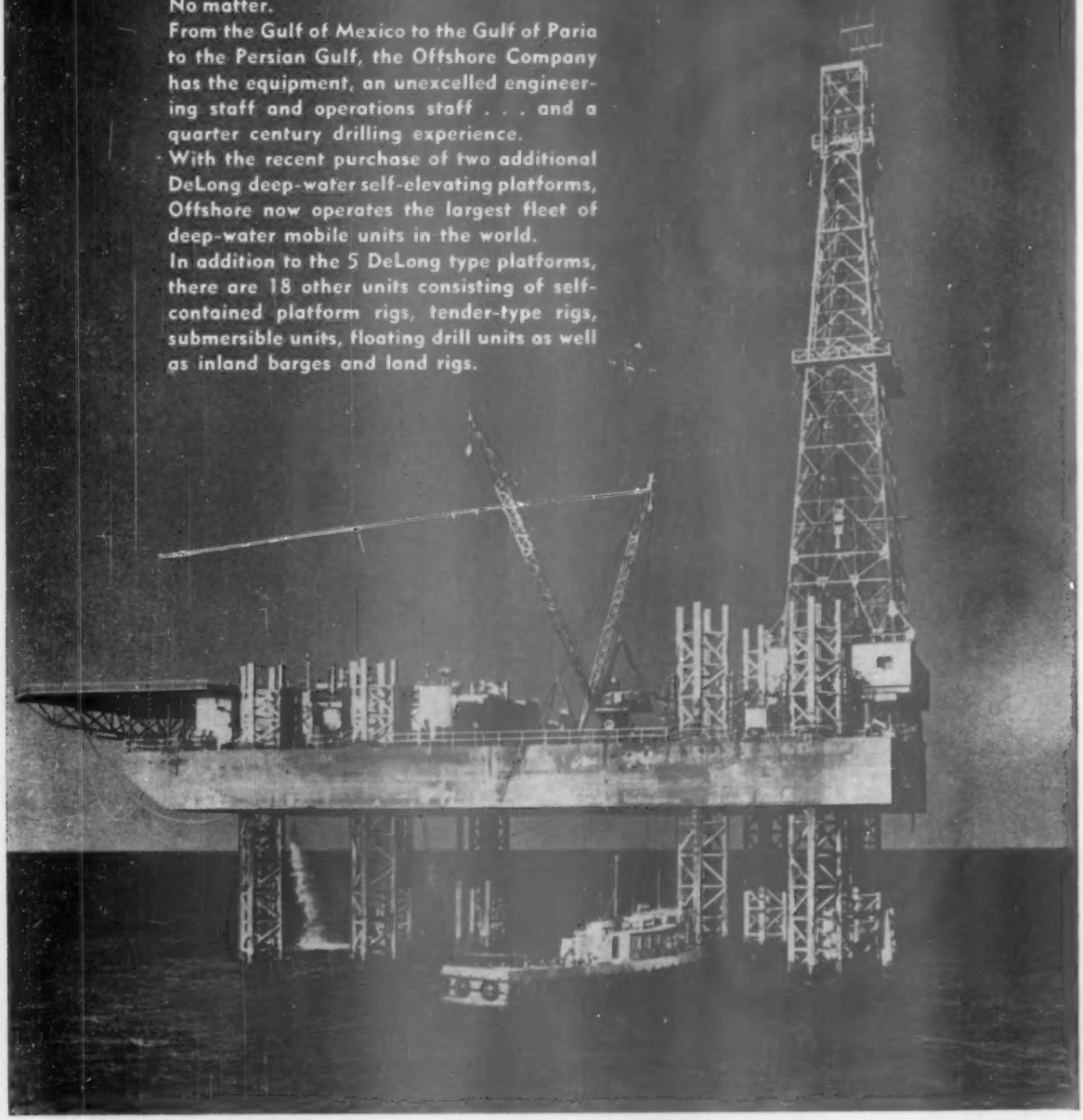

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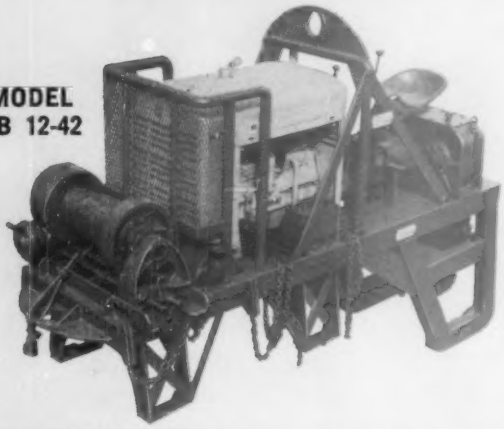

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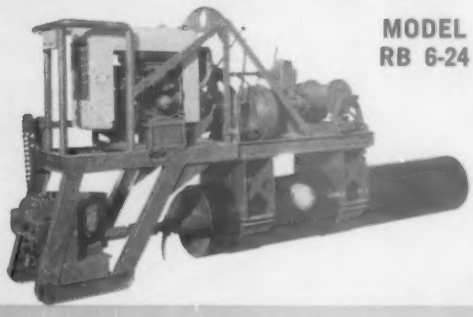

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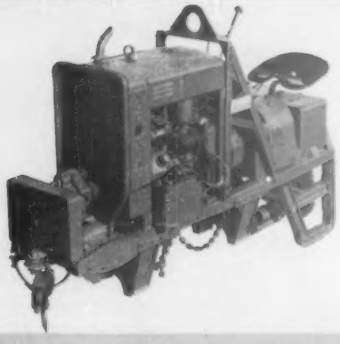

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They Say—

Scrambled captions

Dear Sir:

The article "Centrifugal Mud Pumps Are Big Money Savers for Gulf Coast Drillers," in the December 5 issue (p. 106) is very well presented. However, captions on pages 107 and 108 are misplaced.

Picture top left on page 107 is high-volume centrifugal mud pump; top right is 4-in. supply line of the mud hopper; lower left is supercharging of main mud pumps; lower right is the operating degasser; and the Land Rig on page 108 is the piping layout used by Delta Drilling on Land Rig 17.

Foster Manning
Division Engineer
Delta Drilling Co.
New Orleans

Comprehensive report

Dear Sir:

I found your article on LPG storage caverns in the November 28, 1960, issue of The Oil and Gas Journal (p. 85) most interesting. I did not fully appreciate previously the development of this phase of the gas industry.

I am sure that extensive research was required for the preparation of this article.

A. L. Luttropp
Manager, Project Sales
International Operations
Worthington Corp.

Alaskan completions

Dear Sir:

Please refer to your chart indicating October's well score (OGJ, Nov. 28, 1960, p. 125). This chart indicates that only one well was completed during the month of October in Alaska—a dry hole at that.

Actually five wells were completed during October, two of which were exploratory wells drilled and abandoned by Union Oil Co. of California on the Knik Arm northwest of Anchorage, and three producing wells in the Swanson River field, Standard Oil Co. of California, operator.

You might consider giving Alaska a separate column in your chart concerning daily average production for the week instead of continuing to carry the state in the status marked "other." Our daily production is currently running about 5,000 bbl. per day.

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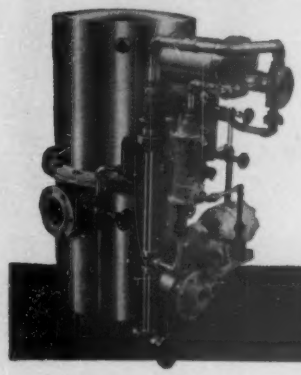

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I would also like to comment on a letter you received and published from one F. N. Bosco in the October 31 issue (p. 32) in which he states that Anchorage Oil & Gas Development Co. drilled four gas producers in the Susitna Flats area. This division has never recognized any of these wells as capable of producing anything more than traces of gas. One well is suspended and the other three have either junk in the hole or well damage.

Donald D. Bruce
State Geologist,
Petroleum Branch
Anchorage, Alaska

Editor's note: The wells mentioned in this letter appear in the November table. A time-mail lag sometimes keeps Alaskan statistics from being as up-to-date as we would like them to be. The Journal hopes to improve this situation.

Letters to They Say should be addressed to The Editor, The Oil and Gas Journal, Box 1260, Tulsa, Okla.

CALENDAR

DECEMBER

26-31 American Association for the Advancement of Science, annual meeting, New York City.

JANUARY

13 Southern Gas Association, research and development roundtable conference, Paso del Norte Hotel, El Paso, Tex.

15-16 Oklahoma Independent Petroleum Association, annual meeting, Mayo Hotel, Tulsa.

15-18 Pipe Line Contractors Association, annual meeting, Mark Hopkins and Fairmont Hotels, San Francisco.

16-19 Instrument Society of America, winter instrument-automation conference and exhibit, Sheraton-Jefferson Hotel and Kiel Auditorium, St. Louis.

17-19 Kentucky Petroleum Marketers Association, annual meeting and convention, Brown Hotel, Louisville.

18 Institution of Mechanical Engineers (Great Britain), symposium on pressure vessel research toward better design.

19-20 API Committee on Public Affairs, Los Angeles regional conference on employe communications, Statler-Hilton Hotel, Los Angeles.

20 Natural Gasoline Association of America, Gulf Coast regional meeting, Robert Driscoll Hotel, Corpus Christi, Tex.

20-21 Association of Oilwell Servicing Contractors, fifth annual convention, Dallas.

22-24 Kansas Oil Men's Association, annual convention, Broadview Hotel, Wichita.

24-27 Society of Plastics Engineers, seventeenth annual technical conference, Shoreham Hotel, Washington, D. C.

26-27 American Chemical Society, Southeastern Texas Section, fourth symposium on hydrocarbon chemistry, Shamrock Hilton Hotel, Houston.

30-Feb. 9 University of Illinois, annual quality control short course, Urbana, Ill.

FEBRUARY

7-8 University of Oklahoma, School of Petroleum Engineering, advanced petroleum engineer seminar, University of Oklahoma, Norman.

8-10 Southwestern Legal Foundation, twelfth annual institute on the law of oil, gas, and taxation, Southwestern Legal Center, Dallas.

9-10 API Committee on Public Affairs, New Orleans regional conference on employe communications, Roosevelt Hotel, New Orleans.

9-11 National Society of Professional Engineers, winter meeting, Hotel Fort Des Moines, Des Moines, Iowa.

14-15 National Association of Corrosion Engineers, Shreveport, La., section, short course, Centenary College, Shreveport.

15-16 Western Petroleum Refiners Association, Gulf Coast regional technical-industrial relations meeting, Rice Hotel, Houston.

16 API Committee on Public Affairs, Dallas regional conference on employe communications, Sheraton-Dallas Hotel, Dallas.

18 Purdue University, business history conference, "Management Decisions Under Government Regulation," Memorial Union, Purdue University, Lafayette, Ind.

20-Mar. 11 Advanced Drilling Practices Course for Engineers, University of Oklahoma, Norman.

24 Natural Gasoline Association of America, South Louisiana regional meeting, Lafayette Petroleum Club, Lafayette, La.

26-Mar. 1 American Institute of Chemical Engineers, petrochemical and refining exposition, Municipal Auditorium, New Orleans.

26-Mar. 2 American Institute of Mining, Metallurgical, and Petroleum Engineers, annual meeting, Chase and Park Plaza Hotels, St. Louis.

28-Mar. 1 API Committee on Public Affairs, New York regional conference on employe communications, Park-Sheraton Hotel, New York City.

MARCH

3 Ohio Oil and Gas Association, winter meeting, Deshler Hilton Hotel, Columbus.

5-9 American Society of Mechanical Engineers, gas-turbine power division, and U. S. Department of Defense, annual gas-turbine conference and products show, Shoreham Hotel, Washington.

7-8 University of Oklahoma, School of Geological Engineering, seventh biennial geological symposium, Student Union Building, University of Oklahoma, Norman.

8-9 API Committee on Public Affairs, Chicago regional conference on employe communications, Sheraton-Towers Hotel, Chicago.

8-10 American Petroleum Institute, Division of Production, southern district meeting, Captain Shreve and Washington-Youree hotels, Shreveport, La.

13-16 Kentucky Petroleum Marketers Association, sixth management institute, conducted by the University of Louisville, Brown Hotel, Louisville.

13-17 National Association of Corrosion Engineers, annual meeting and corrosion show, Hotel Statler, Buffalo, N. Y.

15-17 Natural Gasoline Association of America, annual convention, Baker Hotel, Dallas.

16-17 International Oil and Gas Educational Center, study of the economics of petroleum exploration, development, and property valuation, Southwestern Legal Center, Dallas.

21-23 American Power Conference, twenty-third meeting, Sherman Hotel, Chicago.

22-24 American Petroleum Institute, Division of Production, southwestern district meeting, Cole Hotel, Albuquerque.

23 National Industrial Conference Board, general session, Shamrock-Hilton Hotel, Houston.

27-29 Midwest Gas Association, annual meeting and convention, Sheraton-Fontenelle Hotel, Omaha.

27-31 Instrument Society of America, symposium on temperature measurement and control in science and industry, Veterans Memorial Auditorium, Columbus, Ohio.

28-29 University of Oklahoma, Schools of Petroleum and Gas Engineering, gas conditioning short course, Oklahoma Memorial Union Building, University of Oklahoma, Norman.

APRIL

4-5 University of Kansas, gas compressor institute, Liberal, Kans.

5-7 American Petroleum Institute, Division of Production, Mid-Continent district meeting, Mayo Hotel, Tulsa.

6-7 University of Oklahoma, School of Mechanical Engineering, short course on industrial engines, University of Oklahoma, Norman.

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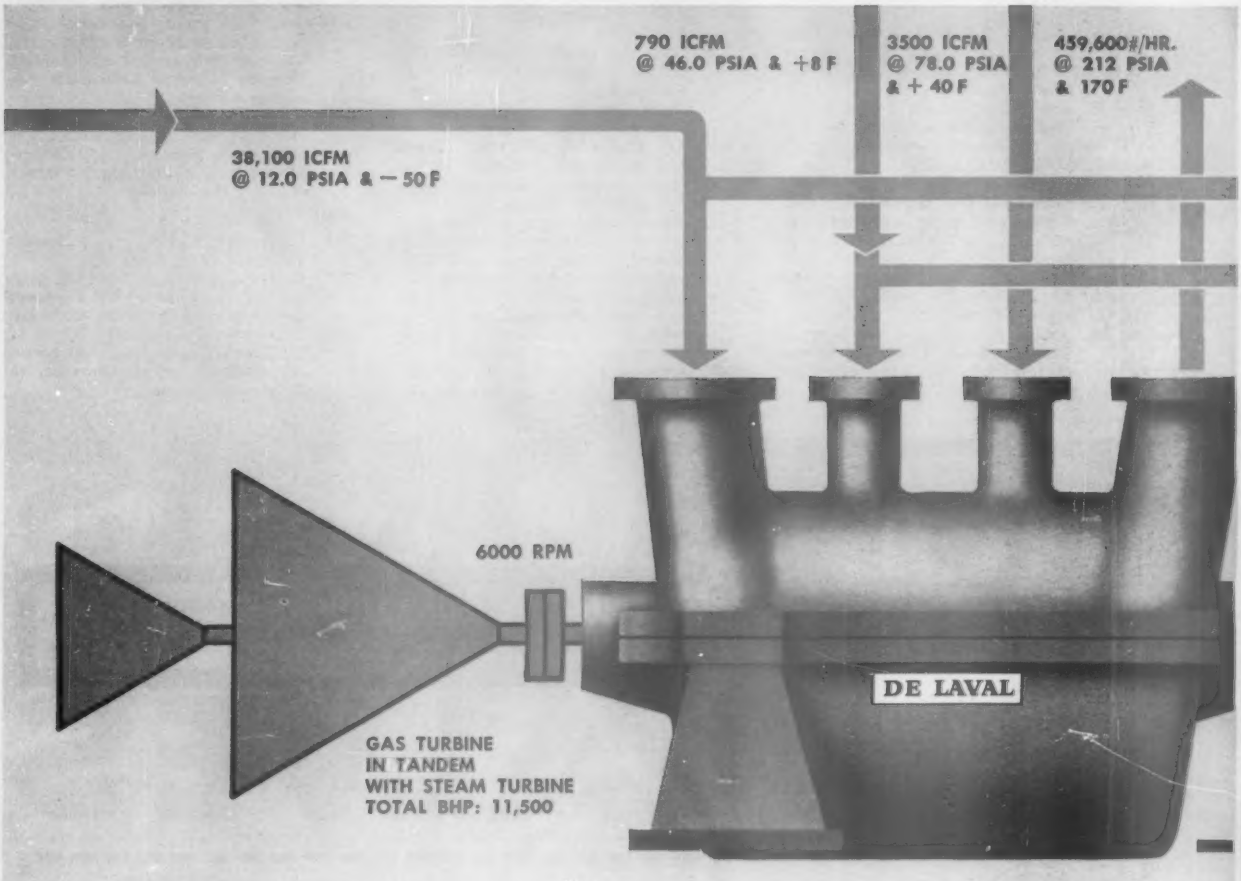

NATURAL GASOLINE PLANT—PROPANE REFRIGERATION

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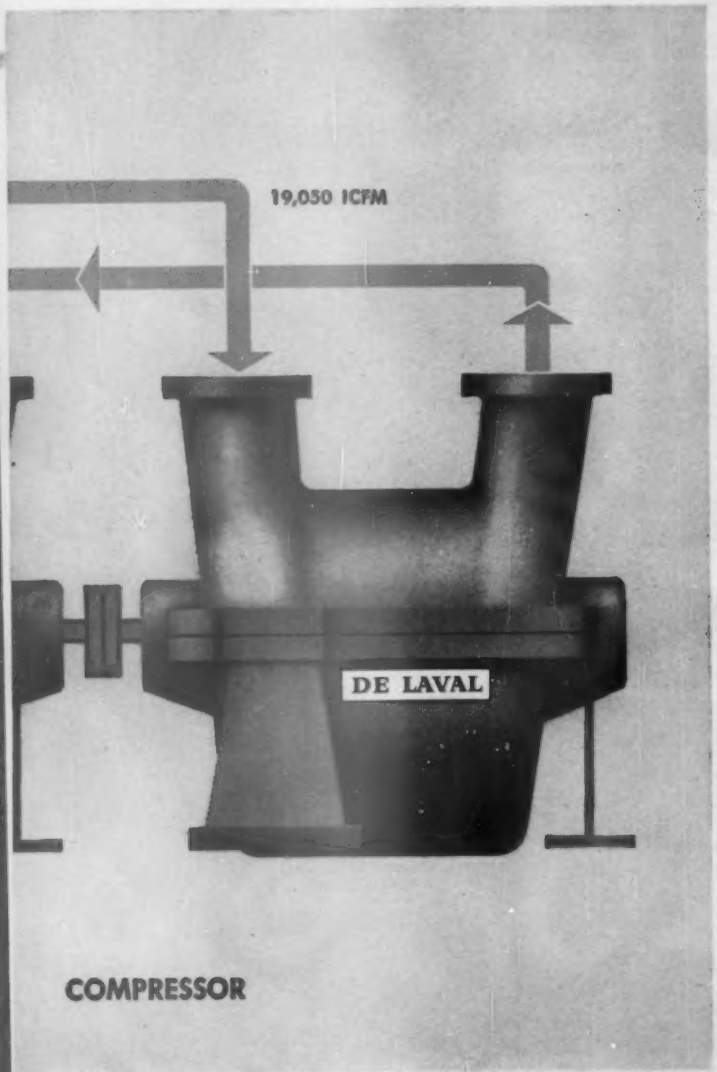

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50 years ago

December 29, 1910

Big oil wells now being brought in in rich Osage Junction pool in the southwestern part of the Osage Indian reservation on the north bank of the Arkansas River opposite Cleveland, Okla., are beginning to give the oil industry overproduction chills despite the state's generally declining production. Wells flowing initially 1,500 to more than 4,000 bbl. daily are building up a sizable daily output from the area.

The notorious Lakeview gusher at Midway, Calif., which has been flowing out of control since March 15, suddenly jumps its water output from less than 12% to more than 60%. Operators abandon efforts to separate the oil and are diverting the flow from oil reservoirs. Daily output has been as much as 90 000 bbl., and averaged from 35,000 to 50 000 bbl. for a long period. For the past 2 months it has been down to 10,000 bbl., making from 1 to 12% water.

25 years ago

December 26, 1935

Major refinery building and expansion program sweeps Pacific Coast. New construction at highest level in 10 years. Nearly all plants are adding modern units or expanding and modernizing older installations.

Blowing in of oil gusher 675 ft. from governor's mansion near Oklahoma's capitol grounds launches intensive drilling and development play in prolific north extension area of big Oklahoma City field. New British American Oil Producing Co. well flows 500 bbl. of oil per hour with 20 M.M.c.f. of gas per day. Crude-oil-purchasing companies start scramble for connections.

10 years ago

December 28, 1950

First natural-gas deliveries through Transcontinental Gas Pipe Line Corp.'s new 30-in. main line from Texas reach New York. Deliveries to Philadelphia, New Jersey cities, and various smaller communities along the route to begin next week.

Three leading California independent oil companies change ownerships in separate purchases involving multimillions of dollars. Jergins Oil Co. goes to Lehman Corp. and Smith Barney & Co. of New York for $30,000,000. Union Oil Co. and Nassau Co. buy Havenstrite Oil Co. for $12,000,000. General American Oil Co. of Dallas acquires North American Consolidated Oil Co. for $25,000,000.

Federal Government calls on oil industry to hold crude and product prices to December 8 levels.

JOURNALLY SPEAKING

International Oil Virus

THE PAGES and pages of cold statistics about oil activity across the world in this issue are undoubtedly valuable reference material.

But they completely ignore the romance, the drama, the human interest. If we were assigned to write a report on international oil we would reverse the process. We would ignore the statistics and tell about how people everywhere are reacting to what is, in reality, a revolution in the oil industry.

We might take our theme, or text, from a tiny item that slipped through the Iron Curtain from Hungary recently. It reported that Hungarian petroleum engineers have developed a strain of bacteria that live on crude oil. They plant a culture of these bugs in the bottoms of oil wells where they grow and give off gas, just like a cake of yeast in a batch of bread dough.

This generates a gas drive, repressures the field, drives the oil to an adjacent producing well, and presto—bacteriological secondary recovery and oil riches with practically no work at all.

We would then draw an analogy and show how a similar type of bug seems to be working on people in just about every country that has any oil or any hope of ever having any. They are afflicted with a virus that makes them expect oil riches with practically no work—or investment, or responsibilities—at all.

A generation ago, soon after World War I, it was fashionable to write books and magazine articles about oil imperialism and the international struggle to control the world's oil resources. It was assumed that oil could be found in only a very few places in the world, and in very limited quantities, and that whatever nation could control these sources would be the military and economic dictator of the world.

This made the people in potential producing areas feel like pawns in an international chess game, and they reacted by resisting exploitation and trying to hoard their precious resource. And the people of nonproducing nations looked upon oil as a luxury import, like silk or coffee, which could be tolerated but should not be encouraged.

But today, as we would point out if we were writing a world review, attitudes have changed completely.

Today every nation seems to be affected by a petroleum virus which is certainly generating a lot of political gas even though it may not result in actual oil production. Producing countries want to exploit their resources without limit, and instead of denying oil to others they are trying to force more oil on them.

Countries without oil production assume that they will have some soon, and they also seem to assume that getting oil riches will be about as effortless as planting some yeast culture at the bottom of a hole. They don't want to put up any money themselves, or drill a discouraging series of dry holes, or suffer all the headaches of building up a going oil industry complete with markets. They expect somebody to set them up in business and then get the hell out.

With everybody getting into the act, and all trying to be big-time oil sellers, the economics of the business is beginning to look a little shaky. Oil prices are dropping, and this burns up the producers who were nurtured on the belief that possession of oil is ipso facto easy wealth.

In consuming countries the oil virus generates different symptoms. There it takes the form of demands for give-away prices for imports but high internal taxes on oil after it is landed, thus giving the local governments an easy route to oil riches with practically no work at all.

All this is laying the groundwork for a global drama of national rivalry, personal intrigue, and economic maneuvering as a result of the mental bacteria that generate a gas which makes it look easy for everyone to get oil riches with almost no effort.

If we were writing a review of oil across the world we would dig into this aspect. But we're not, so you'll have to read it between the lines in our pages and pages of statistics.

—*Henry D. Ralph.*

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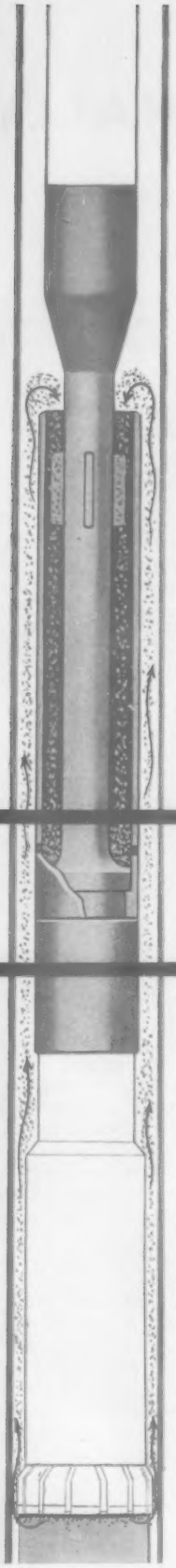

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Self-restraint is prerequisite to any world proration plan

SOME ADVOCATES of international oil proration are putting the cart before the horse. They are so intrigued with evolving elaborate machinery and formulas that they could miss the main problem.

The real problem is management of a world surplus of producing capacity so that it will be a blessing rather than a curse, so that it will sustain an adequate flow of capital rather than be a suffocating blanket on growth and progress.

What is needed is some balancing factor, some stabilizing force, that will prevent the world export markets from deteriorating into chaos.

SELF-RESTRAINT, practiced for rational self-interest and long-range local benefit, must be the basis for any stabilization plan. With this, almost any sort of machinery will do; without it, no plan will work.

Years ago a half-dozen big companies maintained an informal balance of power over international oil markets. They didn't glut the market, didn't dump surpluses at distress prices, didn't engage in uneconomic crosshauls or market raids—but neither did they run up unreasonable prices to consumers.

This didn't work perfectly, but it worked well enough—which is another important point. Stabilization doesn't have to be 100%; it just has to provide enough balance so that conditions will be reasonably predictable.

Today there are so many exporting companies that they can't do the job by themselves. The governments of the larger exporting nations must take a hand. But they shouldn't dictate arbitrarily. Mutual objectives and understanding with their concessionaires is vital.

It is to the self-interest of an exporting country to avoid ruining its market by exporting more than can be sold at a reasonable price. The proper figures of volume and price must be reached by the combined judgment of all concerned, and may be subject to frequent variation.

This is primarily an internal matter, and each country should do it whether or not there is international cooperation. It may seem hard for one country to take the lead when others lag, but this is the essential first step toward stability and balance.

If three or four big exporting countries do this, a working balance of power might be achieved informally. Then would be the appropriate time to consider a formula for dividing the world market among all exporters.

WHERE THERE'S A WILL there's a way—but the will must come first. There must be an attempt to manage one's own surplus capacity before attacking the surpluses of others.

Exporting companies and countries have too much at stake to postpone facing up to the task of managing their abundance, either in hopes that they can wait out the period of surplus or until there is complete agreement on a perfect formula for giving each his "fair share."

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How Oil's Leaders Look at 1961

Fifteen top executives give their predictions for the new year.

Use these exclusive statements to check your own analysis of the 12 months ahead.

Swearingen

Long

Spencer

John W. Swearingen, President
Standard Oil Co. (Ind.)

The year 1961 should be a good year for the oil industry. But there are uncertainties. These include the economy, the weather, political actions, and the industry itself. So, assumptions have to be made.

In predicting a good year, I am basing it on the belief that the current decline in the economy will not be severe and will bottom out in the second quarter; that winter weather will be normally cold; that there will be no drastic governmental actions, and that there will be no deterioration in the supply-demand ratio nor in product prices.

On these assumptions, domestic demand for products and domestic crude production should be around 3% higher than in 1960. In the Free World outside North America, the figure should be at least twice as high. Domestic earnings should increase about 5%. Earnings abroad should be as good as 1960's, and possibly better. Capital expenditures should be about the same as in 1960.

The industry is beginning to show an appreciation of the fact that volume alone is not the sole consideration in marketing its products. A marked determination to stimulate demand and create new markets, and a growing awareness that cost control is vital to profitability are positive factors that should contribute to the health of the industry in 1961.

P. C. Spencer, Chairman
Sinclair Oil Corp.

The start of 1961 appears destined to find the oil industry in better shape than for several seasons past.

It has been chastened and toughened by adversity, and strengthened to some degree by self-imposed disciplines. However, each of us must still guard carefully against the delusions of the "incremental barrel" and the narcotic notion that it is all the other fellows who are keeping refinery runs at dangerously high levels.

Maybe we can learn something by reviewing the enthusiastic predictions of industry leaders reported for 1960 in the January 4, 1960, edition of The Oil and Gas Journal. The consensus then appeared to be that demand would be up in 1960 by 4% plus, and plans for the year were geared to that prospect.

The facts show that the prediction overshot the performance by about 50%, with resultant profits for the year substantially below what should have been a readily attainable goal. It is unfortunate enough to miscalculate by 50% a prospective increase in future market demand, but if refinery runs are maintained on such erroneous basis, or for some other equally fallacious reason, the results of the original error are compounded and the entire industry suffers accordingly.

Surely there is an expensive lesson here. Let's hope that we have learned it well and that our outlook, while optimistic, will be tempered with hardheaded realism. If we do this, we should be on our way to a better 1961.

Augustus C. Long, Chairman
Texaco Inc.

Texaco looks forward to a good year in 1961, and we anticipate that domestic demand for petroleum and petroleum products will increase from 2 to 3%.

Despite the fact that there may be a continuance of a mild recession during the first few months of the New Year, a general business upturn should occur during the third or fourth quarter. In addition, the petroleum industry on the whole is more resistant to general downturns in the economy than most other kinds of business.

The most pressing problem in the oil industry is that of learning to deal with surplus reserves of petroleum in the ground. Other industries have similar problems; for instance the steel and automobile industries have enough capacity to produce far beyond the ability of their respective markets to absorb their maximum output.

However, the companies operating in those industries seem to exercise better business judgment in evaluating inventories and market conditions. Those responsible for directing the day-to-day business activities of the oil industry must exercise this same type of discipline if we are to continue as a healthy, growing, dynamic industry.

There will be many problems confronting our industry in 1961, not the least of which will be the fight to con-

Warren Willetts Dunlop Potter

tinue or increase the already high taxes on our principal product, gasoline. Others will include attacks on percentage depletion, renewed efforts by the coal people to obtain end-use controls, and what appears to be a never-ending series of harassments by the federal and state agencies with respect to marketing activities.

On the international front, there has been much speculation as to the extent of economic penetration by the Communists into what are now regarded as free world markets. We are inclined to feel that the Russians will use whatever petroleum is available for export primarily for political purposes. Furthermore, petroleum is their chief earner of foreign exchange and there is no reason to believe that they would willingly upset markets except where such action would serve a political purpose.

We also feel that the federal program of mandatory import controls as presently administered is completely arbitrary and, in particular, discriminatory to historic importing companies.

The basic defect in making allocations on the basis of domestic refinery runs is that it completely ignores the tremendous risks and investments made by those companies which pioneered in going ahead to find oil, in most instances with the encouragement of our own Government.

We feel that a system of tariffs would prove more fair and more practicable than a patchwork of arbitrary decisions. At the very least, the present plan should be amended to provide that domestic refiners receiving import allocations be required to refine this crude in their own plants.

J. Ed Warren, President
Cities Service Co.

The essential factors that will influence the well being of the petroleum industry are well known and stand out clearly when we look forward to 1961.

These factors of demand, supply and capacity will, in themselves, not produce a result much different than experienced in 1959 and 1960. The problems next year will be the same as we have had in the past few years, and the level of the industry's prosperity will be keyed to the manner in which the competing units of the industry voluntarily and independently handle surpluses.

A review of the conditions and trends that affect petroleum demand indicates an increase in the range of 2 to 2½% can be expected. The demands for the essential products that generate dollars—gasoline and distillates—are expected to increase 2.3% and 2.5% respectively.

The percentage increases are not large. They do mean volume will be higher than ever before, but the gain will be in no way comparable to the spectacular increases of the years 1946-1957. In that period, the industry's main effort was to build supply in order to keep abreast of the growing demand.

Today, crude oil productive capacity and refinery capacity are in excess of current needs and there is oversupply in product inventory. These circumstances will continue to be the important factors in 1961. Increases in efficiency rather than creating new supply and facility availability will represent progress next year.

The results obtained in 1961 will depend on the maintenance of efficient inventory positions and operational activities geared to the realities of current capacity and current demand under the severe competitive conditions which have always existed in the industry.

L. T. Potter, President
Lone Star Gas Co.

For many years the oil and gas industry has experienced dynamic growth. We moved always forward. In the critical years of this decade, growth opportunities will exceed those of the past.

There is a difference, however. Opportunity lies ahead but the road has alternative, hazardous routes.

By 1970, gross national product is estimated to reach $770 billion, a gain of some $267 billion over 1960. Population will swell from 179.5 million to 210 million.

These projections insure increased demand for energy. But the energy selected by the consumer will be based on preference, not on availability alone. Aggressive marketing, advanced research in new product development and efficient management to keep prices competitive are essential to maintain consumer preference.

There also must be close communication between the oil and gas industry and the public. An informed public can become our most effective ally. Realistic and impartial regulation at all government levels can only be attained through the support of the public our industry serves.

Herbert Willetts, President
Mobil Oil Co.

The domestic industry should start the year in a fairly good inventory position and with better prices than a year ago. Demand for oil products in 1961 should increase over 1960 by about 2% in the United States and Canada.

In the first half of 1961, demand will probably be held down by a lower level of economic activity, although there should be an improvement in the second half. Even automotive gasoline sales may rise little more than 2% for the year. Aviation gas consumption will fall, but this should be more offset by an estimated increase in jet-fuel sales (including military) of about 19% in 1961.

Sales of kerosine and heating oils are being depressed by rising demand for liquefied petroleum gas and natural gas. Kerosine sales should drop about 9%. Consumption of regular distillates, including diesel, should rise about 1.2%. Demand for residual fuel, the product most affected by the dip in industrial production, is expected to decline about 1%. Sales of LPG, asphalt, waxes, coke, and refinery gases should go up about 5.5%. Crude-oil production should increase by 2 to 3%.

Forecasting about any phase of the oil business is particularly difficult this year, with a new national administration coming into office. We must wait to see how the new administration will deal with problems such as nat-

Jones

Taliaferro

Milligan

Carthaus

ural gas, imports, gasoline and other taxes, inflation, depletion, and a national fuels policy.

We needn't wait, however, to make up our minds about two things: First, competition from other energy sources is becoming more intense, which means we must sell the consumer on the advantages of oil, and find new uses for it. Second, competition within the oil industry is also intensifying, which puts an increasing premium on efficiency and cost reduction.

Even so, this is still a good business to be in.

Robert G. Dunlop, President
Sun Oil Co.

I think it is becoming increasingly apparent that oil's growth rate is stabilizing at a level somewhat below that experienced during most of the postwar period.

Domestic demand for oil products in the coming year will likely show a modest 2% gain over 1960. Coupled with rising sales of natural gas and generally steady product prices, this gain in volume should result in earnings equal to or slightly exceeding those of the past year.

The amount of crude oil processed in refineries in 1961 will probably top the 1960 total by 1.5 to 2%, with domestic crude-oil production rising by an estimated 2.5%.

Looking back, 1960 was somewhat disappointing in that demand did not come up to expectations. Over-all, however, the year brought some improvement in oil operations. The inventory position was improved, product prices strengthened in the second half, and earnings showed a gain over previously depressed levels.

Although supply was brought into a better balance with demand during the past year, further improvement in this area will be a key internal objective in 1961.

Externally, the industry continues to face several critical problems, all relating to government policies toward petroleum. On the natural-gas front, there is still a vital need for new legislation which will spell out a free market approach to gas pricing. Also, the present program for restricting oil imports is experiencing increasingly complex administrative problems, and appears to be too inflexible to meet changing economic conditions. Sun continues to stand behind its earlier recommendation that a higher rate of tariff is the only sound method of controlling imports.

Perhaps the most pressing problem, however, is that of high gasoline taxes. With taxes now at a level where they are acting as a depressant on gasoline consumption, the petroleum industry must continue to lead the drive for tax reduction. A major objective for 1961 is reduction of the federal tax from 4 to 3 cents as scheduled in midyear.

Charles S. Jones, President
Richfield Oil Corp.

In general, 1960 was a good year for the District V petroleum industry. Total demand rose by about 4½% from 1959. Civilian sales within the district were up sharply from 1959. Approximate changes were:

Motor Gasoline	+ 6%
Aviation Fuels	+29%
Distillate Fuels	+ 6%
Residual Fuels	+18%
Other	No Change

Total civilian sales within the district increased by about 8½%.

We expect total demand during 1961 to be about the same as in 1960 as continued long-term contraction in the aircraft industry and the current mild business recession combine to retard growth in petroleum demand. Another important retarding factor would be normal rainfall this winter, since the extraordinarily dry California winter of 1959-1960 decreased available hydro-electric power and hence was an important cause of the impressive 1959-1960 gain in residual fuel oil sales.

While total demand probably will not increase, some individual product categories will. Assuming normal weather conditions, anticipated 1960-1961 changes in civilian sales within the district are:

Motor Gasoline	+ 4%
Aviation Fuels	+ 6%
Distillate Fuels	No Change
Residual Fuels	−13%
Other	+ 4%

Total civilian sales within the district should be unchanged.

Unless District V import controls are relaxed significantly, inventories of all oils should remain tight to adequate; and further price deterioration is not to be expected.

The level of residual fuel oil inventories will depend on the severity of the business recession, the amount of rainfall, winter temperatures, quota levels on the East Coast, military requirements, and world prices. Even so, it is by no means impossible that District V will survive the current economic recession without the massive residual fuel oil stock accumulations which characterized each of the three previous postwar recessions.

New production in Alaska and offshore in California should contribute significantly in 1961 toward halting the long-term decline in District V production. Indeed, a small increase is possible.

Although total demand and local production will both remain about constant, some increase in out-of-district supplies is indicated because part of total demand was satisfied by inventory withdrawals in 1960, whereas only current supply will be used in 1961. The 1960-1961 increase in out-of-district oil should, however, be much smaller than that from 1959 to 1960.

Paul E. Taliaferro, President
Sunray Mid-Continent Oil Co.

Early 1960, of course, was not as profitable as we would have liked; however, the last half certainly brought the year closer to what was anticipated.

The trend which started during the latter part of 1960 should continue during the first half of the coming year.

Carpenter

Vickers

Donnell

Adams

Many oil economists have predicted a product demand increase of 2 to 3% for 1961. We believe this is probably an accurate estimate.

It is true that there is a world-wide surplus of oil which probably will continue in the year ahead. However, the industry appears to be adjusting itself to this situation and learning better how to cope with the results of such a condition in a way that permits it to remain reasonably healthy.

Austerity programs have been good for the industry as a whole and the effects of such programs should be reflected further in 1961.

It seems to me that our industry is approaching the new year rather cautiously, yet not pessimistically. We at Sunray believe this is a proper attitude and that over-all results during the year should show steady improvement.

R. L. Milligan, President
Pure Oil Co.

In the decade following World War II, a consumption of petroleum products in the U. S. increased at a rate approaching 6% annually. In the past 3 years the rate of demand growth has been something less than half that of the previous 10 years. The industry should continue to grow in the future, but at a lesser rate.

The industry has faced many serious problems in the past, particularly the past 3 years, and, while certain of these problems still persist today, strong efforts are being made to resolve them.

The efforts of companies in the industry to "expand demand" through more realistic advertising and programs promoting automobile travel, rather than relying upon extravagant, unrealistic and offensive claims, show promise of increasing gasoline consumption.

Also, improved highway systems, greater decentralization of manufacturing, distribution, and office centers can be expected to increase demand.

W. J. Carthaus, President
Great Northern Oil Co.

The oil industry enters the new year in a position to benefit greatly from lessons taught during 1960.

Early last year, the industry suffered substantially lower earnings as a result of making premature reductions in middle distillate prices.

This was followed by a period of continued high crude runs so that, at the beginning of the motoring season, gasoline stocks were at levels that caused price weaknesses to develop in this area also.

It wasn't until the third quarter that improvement in the industry's operations became evident, and a good measure of the credit for this must be given to the Texas Railroad Commission for holding down the number of allowable producing days.

It cannot be emphasized too often that the key to continued profitable operation will depend upon finding a solution to the double problem that has faced us the past several years; namely, excess crude producing capacity and excess refining capacity.

The industry showed some evidence last year of having learned to deal with this problem. Continued efforts in this direction will help to make 1961 our best year yet.

J. A. Vickers, President
Vickers Petroleum Co., Inc.

We believe that the over-all performance of the oil industry will continue to exceed the level of general business activity.

Domestic demand for petroleum products should increase 2 to 3% over 1960, even though the economy as a whole may suffer further declines during the first half of 1961.

We see no substantial changes politically that would bring about adverse results. This presumes, of course, that our government will continue its splendid program of controlling the importation of crude oil. We strongly believe that in the absence of such a program the world-wide excess of crude production would create chaos within our domestic industry.

Considerable progress was made in 1960 in solving the problems of excessive production of domestic crude, misuse of excess refinery capacity, and the vicious effect of price wars. We expect that a mature, diplomatic handling of these problems within the industry itself will produce more progress in 1961, and if such is true the refining and marketing phases of the business should become solidly entrenched as profit-making functions.

Orville S. Carpenter, President
Texas Eastern Transmission Corp.

The coming year will see a continuation of the giant steps that have been taken in pipelining energy to an expanding economy and a growing population. There is every reason to expect the entire decade of the 60's to provide pipelines with continued challenges and opportunities.

Texas Eastern's interest in the field of energy supply and transport is a vital one. With the wartime Little and Big Inch lines as a base, the company has grown to include over 8,000 miles of pipeline; 2,000 miles in petroleum products service, and over 6,000 miles of gas pipeline.

In order to provide for the increasing requirements for natural gas, Texas Eastern plans to make application for a major expansion in the near future. This is in addition to the 50 million cubic feet per day expansion recently approved by the Federal Power Commission.

The Little Big Inch Division is also making rapid progress. The line has substantially expanded existing terminals, added three new ones this year, and has completed a 96-mile pipeline connecting Little Big Inch with

the Buckeye Pipe Line's western products system.

A third large LPG storage jug was completed at Mont Belvieu during 1960 and one of the caverns at the Todhunter, Ohio, terminal is being converted to butane service. A new butane tariff, effective November 30, will, for the first time, provide pipeline transportation for butane from the Gulf Coast to refining centers in Ohio.

To round out Texas Eastern's role as pipeliner of energy we are actively working with the Consolidation Coal Company in the development of a large-volume coal pipeline from West Virginia to the Eastern Seaboard. We believe this project will become a reality in the near future.

Thus, while retaining its position as a major natural gas pipeline, Texas Eastern has been systematically developing other areas. We ultimately visualize our over-all system handling gaseous, liquid and solid fuel.

This is the most effective manner in which we can meet the challenges and benefit from the opportunities of the 60's.

K. S. Adams, Chairman
Phillips Petroleum Co.

Many positive and negative factors determine results in the petroleum industry for any period and must be considered in predictions for the future.

Use of a few statistical signs to forecast the probable future could be quite misleading, especially if they are applied to highly diversified companies which are strong in less conventional activities. It is my opinion that, assuming an average or "typical" company, the favorable factors will outweigh unfavorable factors during 1961.

Domestic demand for petroleum and its products for 1961 probably will be between 2% and 3% higher than in 1960. This yardstick alone, however, cannot any longer—even if it ever did—measure the economic strength of the industry. For example, natural-gas liquids now comprise about 10% of the industry's liquid raw materials compared with only 1% or 2% a decade ago. Petrochemicals account for a much larger share of petroleum derived products than 10 years ago. Natural gas, another product of the petroleum industry, continues steadily to increase its share of the energy market.

In 1960 the industry in the U. S. has shown signs of more statesmanship and realism in relating levels of products and refinery runs to the market. Excessive inventories were much less in evidence during the last half of the year. Refining capacity is more than sufficient for probable demands during the next few years so overbuilding certainly should be avoided.

Several factors are responsible for a decrease for the fourth consecutive year in the number of exploratory and development wells drilled in the U. S. These included competition from imported oil and domestic natural gas, and increased exploration and producing costs relative to selling prices for the raw materials produced.

In recent years the industry, faced with oversupply and rising costs without compensating price increases, has turned to stepped-up cost reduction efforts in order to realize satisfactory profit margins. Notable advances have been made as a result. Because of recent wage offers there will undoubtedly be more emphasis on cost reduction measures in 1961. Moreover, any wage adjustments will make it necessary to pass on to consumers at least some of the added wage costs.

The compact car's share of the auto market, barring an unexpected sensational increase, probably has reflected its major adjustment in the annual percentage rate of demand increase. The ultimate effect of this development, though not yet clear, may be greater total mileage and increased gasoline use as a result of encouraging more multiple-car family units and more travel.

Markets for the industry's high-volume products haven't yet even been fully tapped. And for the first time a 'real drive seems to be under way to stimulate more travel by American motorists.

In conclusion, well integrated and diversified domestic companies should have an improved earnings picture in 1961 over 1960.

J. C. Donnell II, President
Ohio Oil Co.

There are so many "ifs" involved in forecasting 1961 for the oil industry, expressions of normal concern regarding them could be misinterpreted to indicate a pessimistic attitude toward the future.

This is certainly not the picture I see, although we are going to have to be alert to changing conditions and quickly make appropriate changes in directing the course of our operations.

It is clear that the federal Government is playing a more significant role in the oil industry, and the pending change in administration, therefore, adds new questions for us.

We must be constantly aware of the fact that our business now is intimately a part of the general economy; what is good or bad for the national economy will be correspondingly good or bad for the oil industry. Oil industry management should keep informed on the outlook for the general economy, both domestically and in our relationships with other nations.

But while we are paying close attention to developments in Washington and in the broad and complex international economic picture, our best efforts must be directed toward narrowing the costly gap between the demand for oil industry products and our capacity to produce, refine, and market them.

A particularly significant characteristic of the oil industry has been the continuation of heavy investment in the expansion of all phases of operations, as though the growth of demand in U. S. petroleum requirements had not slackened. This practice has led to a reduction in the ratio of our operations. We have also experienced pressures on prices and a diminished rate of return on over-all investment.

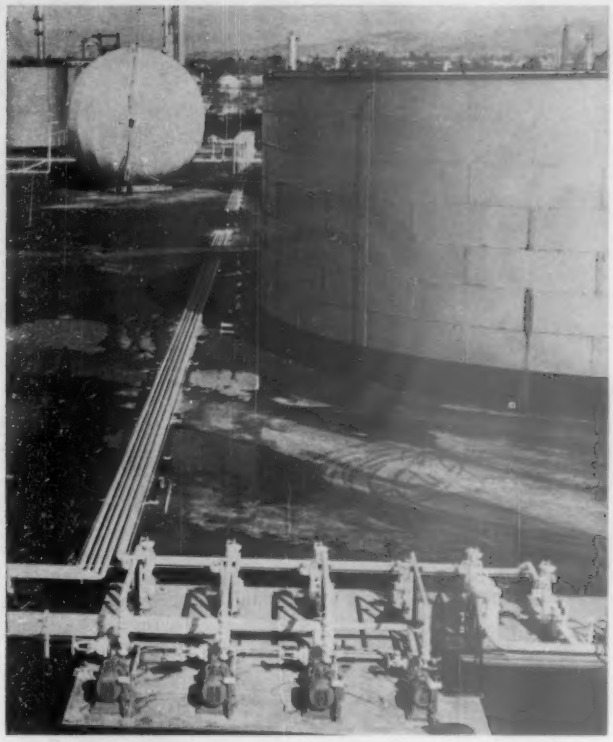
The immediate objective in directing our future capital investments, therefore, should be made with emphasis on efficiency, not additional capacity.

During this period of striving for efficiency, the industry must restrain its output and diligently apply itself to the cutting of costs. We should also adjust our operations for appropriate seasonal needs. I see much evidence of progress in these areas, particularly in the last 6 months of 1960.

With keener competition in all phases of marketing, strong and intensive efforts must be devoted to finding more effective ways for stimulating demand for petroleum products. This will be a difficult task in view of the fact that the expansion in the general economy has lost some of its postwar exuberance.

In my opinion, the oil man of the years ahead is going to be responsible for concerning himself with all governmental activities which influence the general economy and state of the nation . . . because, it must be remembered, the oil industry has a responsibility for helping to keep the national economy competitively sound. No longer can the oil industry be provincial in its attitude toward the general economy, and no longer can it consider its own economic interests as outside the sphere of a much greater economic system.

The new year we are beginning would be a good time for us to dedicate ourselves toward getting started on this broader outlook.



NEW ELECTRONIC in-line blender is entirely controlled . . .

. . . by this console ½-mile from blending stock tanks.

Automatic Blending Introduced by Wilshire

THE REFINING industry's first electronic blender has gone on stream at Wilshire Oil Co.'s refinery in Santa Fe Springs, Calif.

This new step in blending holds promise of being more accurate than the old batch-blending method and also is expected to enable Wilshire to improve its handling of blending stocks and tankage.

The new blender also has some prominent cost-saving features when compared to the cost of installing either a batch blender or a mechanical blender.

With the new electronic blender, Wilshire controls its entire blending operations from a console located about ½-mile from the blending stock tanks.

The company is blending eight gasoline components plus TEL and a dye at the rate of 3,500 bbl. an hour.

How the console works . . . Pulse signals are relayed to the meters controlling the flow of blending stocks. At the meters, the pulses are converted into the rotary motion of a stepping motor. The speed of the meter is paced to follow the speed of the stepping motor.

There are two headings on the console. One shows the amount of component desired for the blend and the other is a report back from the meter on the amount actually going into the blend.

Once the blending operation starts, it continues automatically until the desired blend is reached. Any failures show up on the console and the blender automatically shuts off.

The Wilshire plant is a 30,000-bbl.-refinery geared to turn out 55% gasoline. During a press showing last week, the blender was controlling the flow of TEL, dye, and the following gasoline components: Light straight-run gasoline, light distillate, alkylate, light and heavy cracked gasoline, light and heavy platformate, and butane.

Wilshire is using a set amount of blend stock for each component, but the console can be adapted to operate directly from computer punch cards if frequent adjustments are desired.

J. O. Leverenz, chief engineer at the Wilshire plant, said his company decided to go the electronic blending route rather than revamp its batch-blending operations. The company bought the blending operations as a package deal for $555,000.

Leverenz says the cost of the electronic blender was less than either a revamped batch-blending setup, which would have required more tankage, or a mechanical-blending operation, which would have included some expensive piping not required with the automatic in-line blending operation.

Some advantages . . . The electronic blending has several advantages which are expected to make over-all blending operations a smoother affair.

In addition to getting better usage from blending stocks and tankage due to the closer control of blending, the electronic set up will also be a faster operation. Leverenz said it takes only 1 day to blend the amount it used to take at least 2 days to blend with the batch process.

The in-line blending, of course, eliminates the need for a batching tank and the piping feeding into a central blending operation. Expensive control panels also needed for a central blending plant are not needed.

Leverenz said the new blender also can come up with compositions which would be difficult to attain with batch-blending.

The new operation was designed by Wilshire's staff and C. F. Braun & Co. The meters, control valves, and electronic components were designed and furnished by Proportioneers, a division of B.I.F. Industries Inc.

FPC Changes Urged by House Group

SOME SWEEPING CHANGES in Federal Power Commission rules and procedures have been recommended by the staff of a special House Subcommittee on Legislative Oversight.

The staff also questioned the wisdom of the FPC in attempting to use the area-pricing approach to producer regulation.

It indicated it expects the courts to rule out such an approach. If so, the staff pointed out, the pile-up of cases would become even greater because cases that had been disposed of by area pricing would then be subject to challenge.

The staff made suggestions aimed at speeding up FPC handling of gas cases on a case-by-case approach.

In another highlight of the report, the staff completely cleared both the FPC and company representatives involved in a probe of "ex-parte" contacts in the Midwestern Gas Transmission case.

In a statement accompanying the release of the staff report last week, Rep. Oren Harris (D., Ark.) subcommittee chairman, said the subcommittee itself would make a report no later than January 3.

It was obvious, however, that Harris himself backs much of the staff's report.

If Harris and other members of the subcommittee support some or all of the staff's legislative proposals, an effort to amend the Natural Gas Act likely will be made in Congress next year.

The staff report stems from a series of subcommittee hearings on the operation of the six major federal regulatory agencies, including the FPC.

Proposed legislation . . . The staff made six specific proposals which it said "should be crystalized by hearings and enacted into law." These concerned:

. . . Rate suspensions. The time from the filing of a proposed rate hike until a company could put it into effect should be extended to 18 months, the staff suggested. Currently the period is 5 months.

This longer wait would result in a loss of revenue by a company even though the FPC eventually found that the higher rate was justified.

. . . Multiple rate hikes. Even after 18 months, a proposed rate hike could not be collected if the FPC had not finally ruled on any earlier rate-increase request.

As it is now, a firm can collect on several proposed rate hikes, subject to refund, even though none has been given final FPC approval.

. . . Refund reserves. On rates collected subject to refund, a company would be required to keep at least 40% in a reserve account. Currently, a company may use the revenue but must repay it, with interest, if the rate hike is denied.

. . . Public records. In cases settled by negotiation, as many are, a record would be kept on all proposals and counterproposals and this record would be open to public inspection.

Also, this record would show the amounts involved at the outset and at settlement, and reasons for commission approval of the settlement.

. . . Refunds. A study should be made by FPC to determine whether the refunds it orders actually reach the consumers, the staff recommended.

. . . Intervenors. Legislation should be adopted to limit the number of intervenors, the staff suggested. The purpose: To speed up hearings.

Proposed studies . . . In addition to the legislative proposals, the staff report suggested that further study be given several other issues and possible courses of action. These dealt with:

. . . Area pricing. The staff said this concept should be investigated by Congress. The staff did not, however, recommend an alternate approach to price regulation.

. . . FPC structure. The staff proposed a structural division that would allow a separate branch of the commission to handle only natural-gas cases and permit a second branch to deal with electric power and other matters.

. . . Jurisdiction. The staff said the jurisdiction of the FPC and the Justice Department should be clarified, particularly the issue of who has authority over gas-company mergers.

. . . Claims. Cost-of-service claims by pipeline companies, the staff said, are never challenged by the FPC, which merely checks to determine whether the expenditures were made and were in line with previous charges. The staff implied that justification of expenditures should be required.

Midwestern Cleared

IN THE VIEW of a congressional committee staff, there was no improper "influence" in the handling of the Midwestern Gas Transmission case last year.

A staff report issued last week by the special House Subcommittee on Legislative Oversight included the staff's views on the hearings held by the subcommittee earlier this year as a part of its study of federal regulatory agencies.

The "influence" issue had arisen because of a published report that a Midwestern representative, attorney Thomas G. Corcoran, had learned the content of a pending order affecting Midwestern and had privately urged several of the commissioners to change it before it was issued.

At the hearing, both Corcoran and the commissioners readily admitted there had been conversations between them on the issue of the rate of return Midwestern was to receive. But all denied there was anything improper in this, and the commissioners said they had not been "influenced" by Corcoran's approach.

In its report, the staff said "it would appear that Mr. Corcoran's communications were in conformity with commission practice and were sanctioned by the Administrative Procedure Act."

Furthermore, the staff said, because of the nature of the case and the stage it had reached, Corcoran's actions "could not and did not result in the imposition of an unfairness upon a contesting party because there was none."

It said that "it would seem that the commission was fully entitled to consult with both its staff and representatives of Midwestern."

The staff report noted that because of the huge backlog of cases at the FPC, "there have been numerous ex-parte contacts or extra-record communications with members of the commission by persons seeking to expedite action."

The subcommittee staff made it clear, however, that such ex-parte contacts involving judicial issues of a given case are improper if the case is a contested one.

It pointed out that in the Midwestern case, there no longer was any contesting party. The FPC already had ruled out other applications.

The staff warned that any sweeping law prohibiting ex-parte communications "would destroy the effectiveness of commission regulation."

A Look at Stocks of 18 Oil Companies

Company	Crude Oil			Gasoline			Kerosine		
All figures in thousands of barrels	Stocks Dec. 1	Desired Dec. 1	Above or below	Stocks Dec. 1	Desired Dec. 1	Above or below	Stocks Dec. 1	Desired Dec. 1	Above or below
Sinclair Crude Oil	13,500	14,500	−1,000	7,828	7,800	+28	1,479	1,550	−71
Socony Mobil Oil Co.	18,000	18,700	−700	15,450	14,850	+600	2,200	2,200	....
Shell Oil Co.	16,221	15,808	+413	14,944	14,390	+554	3,435	3,310	+125
Sun Oil Co.	6,583	6,583	.....	4,289	4,389	−100	281	281	.....
Texaco Inc.	19,342	20,100	−758	17,912	18,800	−888	Included in distillate		
Indiana Oil Purchasing	27,993	28,525	−532	15,703	16,317	−614	4,663	4,766	−103
Cities Service	7,312	8,500	−1,188	6,625	6,500	+125	1,663	1,650	+13
Gulf Oil Corp.	13,000	13,500	−500	17,300	15,500	+1,800	2,800	3,400	−600
Phillips Petroleum Co.	1,976	2,208	−232	8,045	7,984	+61	609	667	−58
Standard Oil of Texas	610	750	−140	582	575	+7	31	40	−9
Atlantic Refining	6,505	5,787	+718	2,812	2,826	−14	1,347	1,074	+273
Humble Oil & Refining	18,900	21,100	−2,200	17,100	17,000	+100	3,900	4,100	−200
Continental Oil Co.	5,137	4,950	+187	3,564	3,481	+83	323	385	−62
Tidewater Oil Co.	4,729	4,650	+79	5,270	5,200	+70	581	550	+31
Sohio Petroleum Co.	5,750	6,250	−500	2,700	2,550	−150	800	800	....
Ohio Oil Co.	1,350	1,468	−118	1,931	2,011	−80	1,133	1,168	−35
Pure Oil Co.	4,939	6,160	−1,221	4,105	3,800	+305	1,270	1,260	+10
Skelly Oil Co.	1,587	1,600	−13	1,130	1,130	....	52	42	+10

Gasoline Glut Remains But Total Stocks

STATISTICS given the Texas Railroad Commission on refinery runs and stocks of crude and products of oil companies doing business in Texas indicate the industry is running a tight ship.

Total stocks of crude and products held by these companies as of December 1 were 532,455,000 bbl.—8,462,000 bbl. below their desired composite level of 540,917,000 bbl.

The deficit, they reported, was largely crude oil, with crude stocks 8,522,000 bbl. below desired at 177,518,000 bbl. Smaller deficits of 740,800 bbl. for kerosine, 206,500 bbl. for distillate, and 2,225,200 bbl. for residual largely counteracted a surplus of 3,232,100 bbl. of gasoline.

November refinery runs of companies nominating for Texas crude averaged 5,904,887 bbl. daily. A comparable total is not available. In September, when the commission last requested data on runs, only 13 of the country's largest refiners reported.

November runs of these 13 were down substantially from the September average. The drop was from 5,133,956 bbl. daily in September (OGJ, Oct. 31, p. 62), to 5,019,827 bbl. daily in November, or 114,129 bbl. daily.

And prospects are for a further drop in runs during December because Socony Mobil Oil Co. and Humble Oil & Refining Co. have both announced substantial December cuts.

Weather plays tricks . . . The December 1 reports of individual crude and product stocks showed some distinctly unseasonable changes.

November usually brings a heavy run on distillates while gasoline inventories mount.

But a warm autumn this year caused inventory totals of the 13 companies to do just the opposite. Gasoline stocks fell 1,016,000 bbl. between October 1 and December 1 to a total of 132,154,000 bbl. Distillate inventories moved up 4,967,000 bbl. from 121,111,000 bbl. on October 1 to 126,078,000 bbl. on December 1.

Crude stocks increased during the same period by 4,795,000 bbl. to total 155,079,000 bbl. at the start of December.

Socony Mobil showed the biggest gain in gasoline storage, with a jump of 1,050,000 bbl. Texaco's total, on the other hand, went the other way, registering a hefty drop of 1,629,000 bbl.

Gulf Oil Corp.'s distillate stocks took a big leap of 1,900,000 bbl. to 15,600,000 bbl. Socony Mobil piled up another 820,000 bbl. And Shell added 638,000 bbl.

Socony Mobil, again, showed the largest drop in crude inventory with a loss of 1,100,000 bbl. to 18,000,000 bbl. on December 1. Indiana Oil Purchasing gained 1,943,000 bbl. of crude.

Operating rate down . . . As might be expected, the cut in runs for November was accompanied by a corresponding decrease in per cent of plant capacity operated.

This ranged widely from Standard Oil Co. of Texas' 58.9% to Atlantic Refining Co.'s 93.9%. The median was 82% and the arithmetic average 81%. This compares with a median of 84.9% and arithmetic average of 81.94% in September.

All told, nine of the large companies ran less crude in November than September, three ran more, and one held steady.

Biggest hike in runs was made by Atlantic Refining Co. which processed 197,096 bbl. daily in November, as against only 162,319 bbl. daily in September. Atlantic's per cent of capacity operated went from 77.3% in September to 93.9% in November.

Sun Oil Co. dropped its operating rate nearly 10% from 78% to 68.6% of capacity.

The 35 companies reporting to the commission on November runs showed operations which averaged about 5% higher than the national average of 79.7% of capacity for that month.

The level of operations in 12 major companies and 4 independents in the group ran higher than this national average. This group of 16 companies

Distillate			Residual		
Stocks Dec. 1	Desired Dec. 1	Above or below	Stocks Dec. 1	Desired Dec. 1	Above or below
10,285	9,950	+335	3,090	3,100	−10
19,300	18,450	+850	3,450	2,800	+650
11,891	11,182	+709	2,686	3,496	−810
3,507	3,507	....	708	708	....
12,301	13,100	−799	4,796	5,400	−604
10,768	11,034	−266	3,382	2,621	+761
8,611	8,800	−189	654	700	−46
15,600	16,200	−600	4,600	5,800	−1,200
6,608	7,015	−407	134	107	+27
258	266	−8	76	116	−40
5,754	5,984	−230	844	1,058	−214
18,100	17,600	+500	4,600	5,800	−1,200
3,095	3,450	−355	304	400	−96
6,123	6,250	−127	1,757	1,700	+57
2,300	2,100	−200	200	200	....
1,855	1,951	−96	288	219	+69
1,906	1,725	+181	795	750	+45
1,449	1,448	+1	288	288	....

Take a Dive

showed an average operating level of 86%. They also charged 4,972,987 bbl. of crude to stills each day. This represented 63% of all crude run in the U. S. during November.

The remaining 37% of U. S. crude runs were handled by about 153 refining companies. While a number of these 153 probably had crude runs higher than the national average, they averaged only 72% of capacity as a group. This group comprises 9 majors and 144 independents.

Discrepancies noted . . . A Journal check of the runs reported to the Texas commission indicates that at least two companies are operating at higher rates than shown in the report.

Continental Oil Co. reported its operating rate at 81% of capacity in both the September and November reports. The company reported runs in September of 173,512 bbl. daily and in November of 172,639 bbl. daily. Its capacity, however, is 190,600 bbl. daily. This would indicate a processing rate of nearly 91% of capacity.

Sinclair Crude Oil Co. also is apparently in error. For September, the company reported average daily runs at 412,000 bbl. and a correct operating rate of 88.9%. In November, however, the company processed 422,500 bbl. daily but reported its operating rate at 86.4% instead of 91.2% of capacity.

November Runs of 35 Refiners

Company—	Average runs in barrels daily	Runs as % of capacity
American Petrofina	6,059	60.6
Atlantic Refining Co.	197,096	93.9
Bell Oil & Gas Co.	6,678	83.5
Bryson Pipe Line & Refining	461	50
Cactus Petroleum, Inc.	3,110	77.7
Century Refining Co.	2,656	66
Cities Service Oil Co.	253,533	86.5
Continental Oil Co.	172,639	*81
Cosden Petroleum Inc.	36,351	72.7
Crown Central Petroleum Corp.	33,608	84.0
Danaho Refining Co.	4,125	34.4
El Paso Natural Gas Products	19,214	87.3
Gulf Oil Corp.	461,000	86.3
Humble Oil & Refining Co.	772,000	80.2
Indiana Oil Purchasing Co.	585,200	82
LaGloria Oil & Gas Co.	16,897	70.4
Monarch Refining Co.	2,427	60
Ohio Oil Co.	102,000	93.0
Phillips Petroleum Co.	204,000	75.1
Plymouth Oil Co.	24,034	53.4
Premier Oil Refining Co.	12,002	53.3
Pure Oil Co.	155,586	83.9
Rado Refining Co.	765	51.0
Shamrock Oil & Gas Co.	20,398	78.5
Shell Oil Co.	517,800	87.2
Signal Oil & Gas Co.	49,659	82.7
Sinclair Crude Oil Co.	422,500	†86.4
Skelly Oil Co.	35,175	65.0
Socony Mobil Oil Co.	577,000	81.7
Sohio Petroleum Co.	119,900	70.3
Standard Oil Co. of Texas	44,196	58.9
Sun Oil Co.	174,989	68.6
Suntide Oil Co.	40,455	62.2
Texaco Inc.	637,474	86.3
Tidewater Oil Co.	193,500	70.4

*Reported by Continental. Journal calculations indicate figure should be about 91%. †Reported by Sinclair. Journal calculations indicate figure should be 91.2%.

FPC Okays Texas Price Hikes

THE Federal Power Commission has amended its area-pricing formula to permit a higher price ceiling for four Texas districts in cases where escalation provisions have been eliminated from gas-purchase contracts.

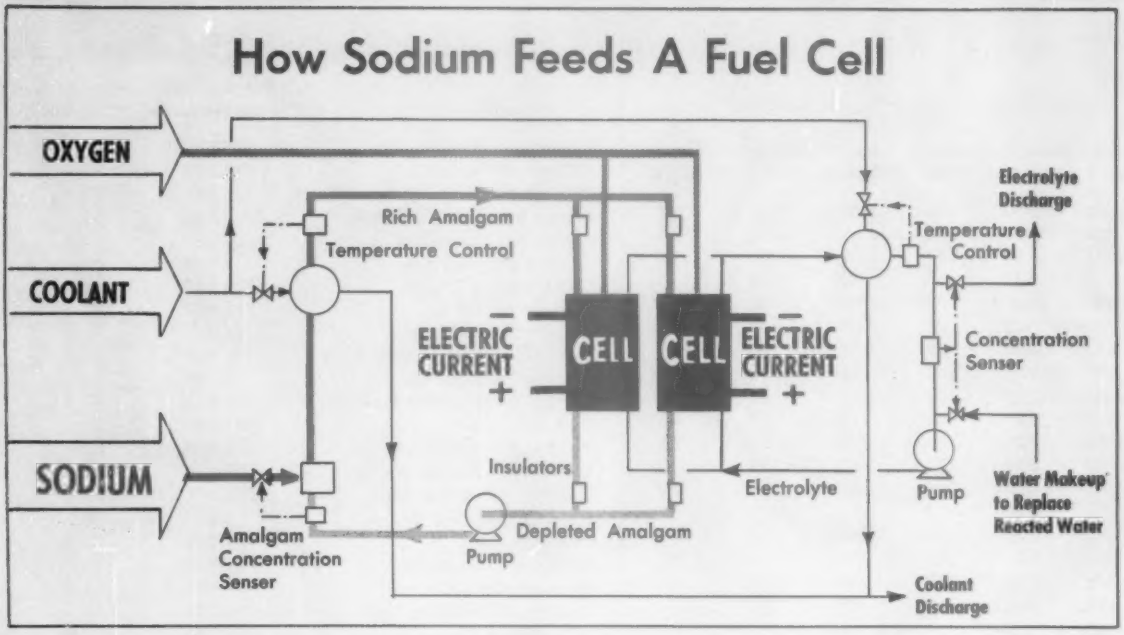
The Texas areas affected are Texas Railroad Commission Districts 2, 3, 4, and 6. They cover about one-fourth of the state, including the southern tip and the area along the Gulf Coast and the Louisiana border up to the Oklahoma line.

In its original area-pricing announcement of September 28, FPC set a price "guide" of 14 cents per M.c.f. on rate increases under old contracts in those Texas districts.

In its action last week, FPC provided that the price could be 15 cents if favored-nation provisions, price-redetermination provisions, and periodic-escalation clauses had been eliminated from contracts.

If only the favored-nation and price-redetermination provisions were eliminated, the ceiling would be 14.6 cents. Furthermore, FPC said, the periodic-escalation provisions which would remain in such contracts could not be made effective prior to February 5, 1963. Additional escalations after that would take effect at not less than 5-year intervals.

FPC issued no explanation as to why it applied the policy to only four districts, with no authorization of a similar change for all other districts covered by its area-pricing approach.



Sodium Reaction Powers New Fuel Cell

• Energy seething from the contact of sodium and water is converted directly into electric power, and makers say the device generates twice as much voltage as a hydrogen-oxygen cell. Prototype plant is being built for the Navy.

THE ENERGY-PACKED reaction from the contact of sodium and water is harnessed in a new fuel cell being developed for naval use.

Using a mercury amalgam of sodium, M. W. Kellogg Co. has devised a cell which prevents explosive effects. Energy from the reaction is converted directly to electrical energy instead of being released as heat.

Kellogg says its sodium amalgam-oxygen fuel cell develops twice the voltage of a hydrogen-oxygen cell. Storage requirements are considerably less, too.

The company is working on a 100-hp. (75 kw.) prototype power plant. This experimental model will weigh between 2 and 3 lb. per kw. hour of capacity. Together with its fuel-storage space, it will be about 15 times lighter than standard electric batteries.

Kellogg's President W. L. Smith says a $764,000 contract with the Navy's Bureau of Ships calls for his company to design and test a complete power plant.

Principle of operation . . . In cells built and tested by Kellogg, the two electrodes are very closely spaced to minimize resistance losses in the electrolyte.

One of the most successful test models has a concentric tube arrangement.

In this version, a cylindrical anode is placed within a cylindrical cathode, with a small radial gap for the electrolyte.

A dilute sodium amalgam forms the anode, with the amalgam supplied as a thin flowing film on the surface of a steel plate. A portion of the sodium is stripped from the film during the chemical reaction. Depleted amalgam is removed from the base of the cell.

Oxygen is supplied to a hollow cathode, one surface of which is a specially formed porous plate of sintered metal or carbon. A solution of sodium hydroxide provides the path between the electrodes.

In an open-circuit condition, a potential of about two volts appears across the cell's terminals. This is nearly twice that of the hydrogen-oxygen cell. As the current is increased, the potential falls through ohmic and electrode losses.

Features of the plant . . . The prototype plant will consist of a number of such cells connected in series. Plant equipment will include a system of chemical supply; means for controlling amalgam and electrolyte concentration; and sensing, circulation, and heat-transfer apparatus.

The plant will operate at atmospheric pressures and temperatures in the range of 150°-160° F. Flow will be continuous.

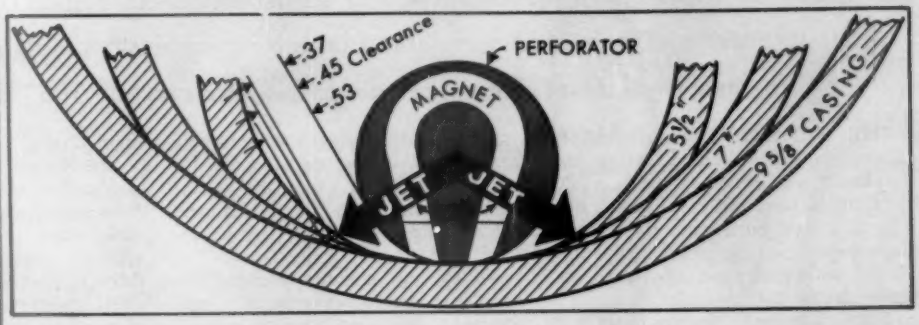
Restoration of the sodium amalgam to its original concentration is a key technique because parts-per-thousand are involved. Depleted amalgam leaving the cells will pass to a concentrator where enough sodium will be added to bring the content to a standard value. Then the amalgam will go through an insulator designed to prevent inter-cell short circuits, and back into the cell.

Concentrated electrolyte will pass through a heat exchanger to remove heat generated in the cell. Next it will pass through a concentration sensing device. Make-up water, to replace that used in the reaction will be added and excess electrolyte removed from the system.

Plants of this kind require very little maintenance.

Just what the Navy intends to do with the sodium plant is still classified information. But it was disclosed that the prototype will be put through pitch, roll, and yaw tests.

Magnet-Type Gun Scores Better on Jet Shots



PERMANENT MAGNET holds perforator to casing walls in new-type gun. Jets can be fired in two directions, 120° apart, or aimed together for zero-clearance firing. At left, the "horseshoe" shows the magnet's location in the new device.

A NEW PERFORATOR uses permanent magnets to get the most out of its jet shots.

The magnets hold the small-diameter, through-tubing perforator against casing walls. Below tubing in the well, the gun can perforate casing as large as 9⅝ in. with a clearance of not more than 0.53 in.

With older guns, clearance might vary from zero to as much as 4½ in. inside 7-in. casing.

The new gun is 1¾ in. in diameter and can be run through 2-in. tubing. Schlumberger Well Surveying Corp., which devised the perforator, says it allows consistent performance regardless of casing size.

The company has not disclosed full details on the magnets used to position the new gun. However, Schlumberger says the magnets require no power from the perforating cable.

U. S. Strengthens Its Phillips-Union Case

THE antitrust department's fight to keep Phillips Petroleum Co. from gaining control of Union Oil Co. is being supported by affidavits from Union's top executives.

These came to light last week when the Justice Department filed a motion in federal district court in Los Angeles seeking a preliminary injunction aimed at keeping the status quo in Union's management and operations.

Sixteen of the nineteen affidavits came from Union executives or employes. They included sworn statements from Reese H. Taylor, Union chairman, and Dudley Tower, Union president. An affidavit also was obtained from W. K. Whiteford, chairman of Gulf Oil Corp.

The affidavits said that:

. . . **Phillips** has tried to buy the $120-million worth of convertible debentures held by Gulf Oil Corp. The debentures can be converted into 2,647,837 shares of Union stock.

. . . **Union** is giving serious thought to expanding its marketing and refining operations to the Gulf Coast or Midwest or "elsewhere east of its present refineries." Currently the company's marketing and refining is limited to 11 western states.

The Whiteford affidavit says that Phillips has offered to buy the debentures. The affidavit says K. S. Adams, Phillips chairman, made the offer on or about last January 27 in Whiteford's office in Pittsburgh. Whiteford said he presented Adams' proposal to the Gulf board, but the board turned it down.

Phillips also has broached the idea of merging with Union, according to an affidavit from A. C. Rubel, who retired early this year as Union's president. Rubel said W. W. Keeler, Phillips executive vice president, discussed the possibilities of a merger in February 1959.

Union's prospects of expanding its markets came from Arthur C. Stewart, a senior vice president of Union. The Government claims if Phillips is permitted to put members on Union's board Phillips will obtain "ultrasecret information concerning Union's plans to expand into marketing areas now dominated by Phillips."

In the civil suit filed December 9, the Government stressed the antitrust action is based on both actual and potential competition between the two companies (OGJ, Dec. 19, p. 63).

Other affidavits . . . In his statement, Taylor said Adams telephoned him May 25 to inform him Phillips had acquired 1 million shares of Union stock as an investment.

The Government's motion declares Adams' telephone call to Taylor "smacks of track-covering."

Taylor said if Phillips gets representation on Union's board it "would limit the vigor of competition by Union and would handicap management."

Tower said the news Phillips had been buying Union's stock "has had a disquieting effect on Union's employes in the departments I head." He says the Phillips action has caused "unrest, uneasiness and insecurity."

Another statement declares Union had no knowledge of who was buying big blocks of Union stock until May 19. The company knew big purchases were being made, but said none of the brokers handling the sales would identify the buyer.

The injunction . . . The motion filed last week specifically seeks to enjoin Phillips from voting its present Union stock or buying any additional stock.

It also seeks to keep Union from issuing any proxies which would enable Phillips to place representation on Union's board.

U. S. Agents Draw Bead on Credit-Card Crooks

• Upswing in fraudulent use of cards brings FBI, Justice Department on the scene. The federal men aren't crusading against swindlers, but they'll fire their legal ammunition in certain cases. Main target: The "big operator."

THE FEDERAL Government is moving in, to a limited extent, on fraudulent uses of credit cards.

Principal target of the Federal Bureau of Investigation and the Justice Department is the individual who makes wide-scale use of illegal or stolen credit cards.

The Government has two charges it can use in such cases:

. . . **Use of mails** to defraud.

. . . **Transportation** in commerce of goods or money falsely obtained.

Several charges in each category have been made this year involving fraudulent uses of service-station credit cards.

The obvious advantage of a federal entry on the scene to combat the rising tide of credit-card frauds is that the FBI can reach across state lines to nab a violator.

Also, a number of states lack statutes which would permit local prosecutions in many instances.

No U. S. "drive" . . . Federal authorities emphasize that they have not launched a campaign against credit-card swindles. But they have alerted U. S. district attorneys to the type of cases on which they may act. This in itself is expected to bring an increase in the number of federal charges filed.

Federal officials also stress that they are not planning to run a collecting agency. Rather, they are after the crook who obviously has established a pattern of fraud in the use of credit cards.

Early this year, Malcolm R. Wilkey, assistant attorney general in charge of the Justice Department's criminal division, sent a directive to district attorneys outlining federal jurisdiction. The directive said, in part:

"Recently there has appeared to be an increase of frauds perpetrated by using credit cards.

"The department is concerned about this type of activity and its consequences on legitimate business and individual holders of credit cards."

Wilkey said the usual case is that in which a person steals or wrongfully obtains a credit card and then uses the card to obtain goods or services. The bill for payment is eventually mailed to the true card-holder.

"The above facts," Wilkey told district attorneys, "in our view constitute a mail-fraud violation.

"There is an intent to defraud both the company issuing the card and the true owner of the card. Use of the mails is essential to the concealment and ultimate execution of the scheme to defraud."

Wilkey said "it is not intended that you (district attorneys) should function as a collection agency, through criminal process, for claims that are appropriately left to civil action.

"Each case will require analysis to determine whether the elements of mail fraud or wire fraud are present."

Growing problem . . . The rapid rise in credit-card abuses has caused increasing concern.

The National Highway Users Conference recently reported that companies are seeking state legislation to regulate the fraudulent use of cards.

The National Petroleum Association also called attention to the problem. It noted that except in eight states which have special statutes, the only recourse available to a company is through civil action.

"In most cases, even if a judgment is obtained, it cannot be collected," the NPA pointed out.

Oil marketers in several states have set machinery in motion to obtain new legislation for credit-card prosecution. At present, states having such special statutes are Massachusetts, Florida, Mississippi, Kentucky, Georgia, South Carolina, Minnesota, and Texas. Seven of the statutes deal with misuse of credit cards generally, while the Texas statute applies solely to the misuse of oil-company credit cards.

Year-End Resid Quotas Raised

THE Department of Interior continues to wage a losing battle in its efforts to comply with a presidential proclamation holding residual fuel oil imports to the 1957 level.

Last week Interior reluctantly increased total allocations for the current quarter by 4,000,000 bbl. to an average of 458,000 bbl. daily during the fourth quarter.

This is 18,000 bbl. daily above imports in the fourth quarter of 1959, and 63,000 bbl. daily above the 1957 fourth-quarter level.

Interior is able to permit residual fuel imports at higher than the 1957 rate because the presidential proclamation authorizes the department to make adjustments if necessary to insure an adequate supply of residual fuel for normal domestic uses.

In making the latest upward adjustment, Interior explained that extremely cold weather beginning in the second week of December created greater demand than had been anticipated when the levels for the fourth quarter were set originally in mid-August.

Last April Interior hiked quotas for that period by 12,000,000 bbl., charging it was forced to do so because a few importers had, "through their marketing policies," exhausted their allocations.

Interior explained this had created a danger that some residual fuel oil consumers would be unable to obtain supplies from usual sources.

Some Interior officials charged that the shortages last spring were caused by aggressive efforts on the part of some large importers to capture new markets for themselves, even if they had to cut prices to win the new customers. Even so, Interior found itself helpless to do anything but increase quotas for that period.

Interior has repeatedly assured residual fuel oil consumers that it has no intention of administering the program in such a manner as to bring

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about "artificial" shortages and consequent hardship to normal users. Therefore, when a shortage looms—whatever the cause—Interior adjusts import quotas to enable suppliers to take care of their consumers' needs.

When adjustments are made, the increase is applied across the board so that all importers get the same percentage increase. This was done in the 4,000,000-bbl. increase just made.

Interior cuts imports into District 5 for first 6 months of '60

INTERIOR DEPARTMENT last week announced oil-import allocations for District 5 (West Coast) for the January-June period without waiting for a decision on import levels for Districts 1-4.

Allocations for the latter were being held up at the time the District 5 quotas were announced because no decision had been reached at the White House on three rule changes proposed by Interior to apply to Districts 1-4.

The total allocation for crude-oil and oil-product imports into District 5 was set at 239,923 bbl. daily.

This total was based on a Bureau of Mines estimate that the difference between domestic-oil supply and demand in District 5 would be 280,000 bbl. daily for the first 6 months of 1961. From this figure, 40,000 bbl. daily were deducted to reflect planned exempt imports into the district.

The remaining 239,923 bbl. of imports daily includes 229,304 bbl. of crude and unfinished oils, and 10,619 bbl. of finished petroleum products. The 10,619 figure includes 3,866 bbl. of residual fuel oil.

The import total for District 5 for the next 6 months falls short of the level for the last 6 months of this year. For the current allocation period ending December 31, permissible levels are 263,836 bbl. daily of crude and unfinished oils and 10,619 bbl. of finished products, including 3,866 bbl. of residual fuel oil.

Import officials pointed out that the lower level for the upcoming period was caused by the expected drop in the difference between anticipated demand and domestic supply.

Individual quotas were granted to 28 firms. Largest of the quotas, in barrels daily, were: Standard Oil Co. of California 36,332, Union Oil Co. 25,133, Tidewater Oil Co. 24,850, Richfield Oil Corp. 24,080, Shell 23,051, Socony Mobil Oil Co. 16,916, Texaco Inc. 15,664, and Gulf Oil Corp. 11,900.

watching WASHINGTON

Clyde La Motte

• An import-control program that doesn't control . . .

ONE PHASE of the government's oil-import-control program needing reexamination is the control of residual fuel imports.

Actually, there really isn't much control of that fuel now. Here's why:

If a resid importer, particularly a large one, uses up his quota before the end of an allocation period, either he or his customers lets the Oil Import Administration know about it in a hurry.

If OIA is convinced there is a legitimate need, it has no apparent recourse other than to hike the import level to let in additional imports. After all, it could hardly let a factory, a school or a hospital do without fuel during cold weather, could it?

Furthermore, Interior is aware that if it holds too tight a lid on residual imports, prices are likely to rise. This would cause prompt and exceedingly loud complaints from residual fuel users and their congressmen.

The net effect, then, is that a residual importer gets to bring in about all the residual fuel he can sell. And there wouldn't be much point in his bringing in more.

The situation causes one to wonder if residual fuel controls in their present form aren't somewhat like a person's tonsils—simply appendages that apparently are of little use.

• Residual fuel and crude are different animals . . .

THE FAULT in the residual fuel oil import program is not so much OIA's administration as the structure of the program itself.

You will recall that residual controls were tacked on the original crude-oil import-control program somewhat as an afterthought.

There is a reason to suspect that they were included as a political sedative to quiet the clamor of a group led by coal spokesmen. They certainly were not proposed by import officials at Interior.

At any rate the mistake, from operational viewpoint, was in patterning residual controls after crude-oil-import regulations. That is like adding apples and oranges.

Limiting crude-oil imports does not create any shortages because there is an ample domestic supply to fill the remaining needs.

But with residual fuel, there is not a sufficient domestic supply. Not at normal residual fuel oil price levels. Thus, if a shortage looms, it is not filled by domestic refiners but by imports. So how do you reduce resid imports without creating shortages?

Each time Interior has tried to hold resid-import levels down—in the first 6 months of this year and in the current quarter—it has been forced to do an about-face before the allocation period ended, and raise the allowables again.

• End-use resid control might be effective, but . . .

IF THERE really is a need to control residual fuel oil imports—and you can easily get a debate on that question—a different control approach will have to be adopted.

One obvious way would be some form of end-use control of residual fuel oil. For example, an importer could be told that none of his quota could be sold for use by a consumer with multi-fuel equipment until the needs of customers dependent on residual fuel had been met.

Even that would not help much because there aren't a great many fuel users equipped to switch from one type of fuel to another. Besides, end-use controls are considered by most oil men as simply another big step toward total government control of their operations.

A simpler and perhaps wiser course would be to drop the resid-control program entirely and let importers bring in supplies as they need them. That is what they are doing now, in effect, and elimination of the program would mean the end of the tug-of-war and red tape currently involved.

Oil Wage Boosts May Kick Prices Higher

• As more firms pass out fatter pay envelopes, management plans to smooth the dent in profits by marking up product costs. Repairs will cost millions.

OIL industry payroll costs will take another jump in 1961, and management already is planning wherever possible to relieve the new squeeze on profits by raising product prices.

Increased labor costs became a sure thing last week when more major oil firms joined the list of those granting pre-Christmas pay increases to their employes.

The new wage pattern still is not crystal clear, but developments indicate raises will be either 5% or 14 cents an hour on a 1-year basis. There's only a slight difference in the rates.

Even less clear than the wage pattern is just how the companies can raise prices to recover the increased wage cost in the face of the unfavorable demand-supply picture.

Case for 14 cents . . . The Oil, Chemical and Atomic Workers International Union, largest in the industry, has thrown its weight behind a raise of 14 cents an hour.

Its original demand of 18 cents was abandoned when it agreed to sign with Sinclair for 14 cents. This was the first major wage agreement in current negotiations. OCAW bargains on a national basis for about 9,000 Sinclair employes.

OCAW preferred the 14-cents-an-hour over two other offers by Sinclair. The Sinclair negotiators, meeting with union representatives in Kansas City, also had offered the union alternatives of a straight 5% raise, or a 15-cents-an-hour increase tied to a 2-year wage freeze.

OCAW President O. A. Knight said "this agreement is 4 cents an hour less than our goal, but it is the best we could do under the circumstances. We are confident similar wage increases will spread through the industry to unorganized as well as organized workers.

"Nearly all our local bargaining committees," he added, "are meeting with oil management in efforts to negotiate wage raises."

Sinclair officials declined direct comment on the OCAW agreement but added that a similar increase was "in the works" for its non-union employes.

The 5% case . . . Knight announced OCAW will "continue to push for cents-per-hour increases rather than a percentage raise."

"We have gone along with the companies on percentage increases in the past but now think it is time for across-the-board increases," he declared.

Percentage increases give the higher-salaried workers a larger raise, while cents-an-hour increases treat all alike. The last oil-industry pay raise was a percentage increase in 1959. Another percentage increase this year will unbalance wage differentials, according to OCAW reasoning.

In most cases the percentage raise would average out at 14.5 to 15 cents an hour or slightly more than OCAW settled for with Sinclair.

OCAW previously rejected offers made by companies for 5% raises tied to a 2-year contract. It has not yet openly rejected several offers of 5% on a 1-year basis being made by increasingly more companies.

Most of the companies which offered the unions a 5% raise immediately boosted their non-union employes by the same amount. This could lead to situations where OCAW members settle for less than non-union workers.

The cost . . . The raises will add millions to the industry's wage bill.

Continental, in announcing its 5% increase, put the cost to the company at $4 million annually. Gulf estimated the same percentage raise will cost it $10 million per year.

Officials of both companies said product prices would have to go up to pay for the cost.

Continental President L. F. McCollum said, "This means the consuming public is faced with the necessity of paying more for petroleum products."

He explained: "When viewed solely from the general economic condition in the petroleum industry there is doubt that this increase is justified at the present time. Other forces have worked to bring this increase about."

McCollum said the increase in costs "cannot be absorbed from the present low-profit margins, which for some time have been on a downward trend."

"Despite many improvements in technology and all our efforts to reduce costs and improve efficiency, Conoco has no choice but to attempt to recover this added cost by increasing the price of its products."

A Gulf spokesman said the company's added payroll costs "must ultimately be paid for by consumers through higher product prices."

Similar sentiment was expressed by Paul E. Taliaferro, president of Sunray Mid-Continent Oil Co., in announcing a 5% increase.

Taliaferro said Sunray Mid-Continent has vigorously pursued cost-reduction and efficiency programs in order to absorb wage and other cost increases and to maintain a reasonable rate of return to shareholders.

"It is impossible for a corporation to continue to absorb additional costs of doing business without increasing prices to the consuming public," he said.

Whether oil companies will be able to recapture the added wage costs naturally will depend on market conditions. An arbitrary price increase wouldn't stand a prayer of sticking unless more controls are exercised on crude production and refinery runs or unless demand should spurt unexpectedly.

Elro Brown, the Gulf Coast regional director for OCAW, took issue with oil management on the price question. He said that predictions call for "one of the industry's best years in 1961" and added:

"There is no reason to gig the public. It is completely unnecessary in view of the marked improvement during the fourth quarter and the outlook for next year."

Gulf Coast talks . . . Two issues are foremost in negotiations at major refineries in the Gulf Coast area:

. . . Conversion of 5% wage-increase offers to offers of 14 cents across the board.

. . . Whether the wage increase will be contingent on extension of the union-company work contract.

The issues are not the same at all plants, but at least one is present in each case. Brown said flatly the union locals will settle for no less than the Sinclair deal.

In the cases of Texaco at Port Arthur and Mobil at Beaumont, only the question of how the increase will be granted stands between the negotiators, Brown said.

Negotiations also are being held

on the Coast with Amoco and Crown Central, who have offered 5% increases tied to a 2-year wage freeze; with Shell which wants a 1-year freeze and renewal of the contract; and with Atlantic, Gulf, and Pure.

Humble has made no formal offer yet to the OCAW local at its big Baytown refinery.

The organized workers in Mobil's exploration and production divisions at Houston and Midland have accepted the offer of a 5% raise effective for 1 year. Mobil's original 2-year contract was rejected.

Atlantic also reached an agreement with an independent union representing 8,000 of its employes for the 5%-1-year-package effective December 1.

Other companies making the 5% offer include Indiana Standard, Sun, California Standard, Tidewater, Amerada, Union, Warren, Signal. In nearly all instances the contract offer is for 1 year.

Texas Gas Tax Held Illegal

TEXAS' "severance beneficiary" gas tax has been staggered by a second adverse court decision.

The Third Court of Civil Appeals in Austin ruled the controversial tax unconstitutional, backing a district-court decision handed down this fall.

Pipeline firms thus won another round in a legal clash which is expected to be fought all the way to the U. S. Supreme Court.

The severance levy, at a rate of 1½% of value at the well head, took effect in September 1959. So far it has piled up more than $11 million in protested payments.

Gas Outlays Zooming Again

AGA forecasts record construction spending for gas in 1961

(In millions of dollars)

Type of Facility	1960	1961	1962	3-Year Total
Production, local storage	205	235	306	746
Transmission	891	1,060	795	2,746
Underground storage	76	101	115	292
Distribution	639	739	771	2,149
General	79	84	86	249
TOTAL	$1,890	$2,219	$2,073	$6,182

A RECORD 1960 expansion for the gas industry will be followed by an even bigger 1961—with $1,060,000,000 in transmission construction leading the way.

Gas-industry spending in all branches (production, transmission, storage, distribution) for 1960 totaled $1,890,000,000. This was 6.7% above the previous record of $1,772,000,000 in 1957 and 9.4% above the $1,728,000,000 in 1959.

A 1961 capital outlay of $2,219,000,000, up 17.4% from this year, is forecast by the American Gas Association in its annual report.

AGA expects spending on new facilities and on system and plant improvements to reach $6,182,000,000 during 1960-62, almost 21% above the 1957-59 figure of $5,118,000,000.

Although 1960 expenditures set a record, they were $343,000,000 below earlier estimates. Some project delays will, in turn, boost 1961 spending estimates $301,000,000 above previous expectations. The change in construction timetables is due mainly to the regulatory lag in processing FPC applications.

The $1,060,000,000 in transmission-construction expenditures for next year is well above the 1960 figure of $891,000,000, which AGA said was a record. The higher level of spending is expected to continue through 1962.

The gas industry is serving more than 33,500,000 customers and is adding a million new customers each year.

New Alberta-to-U. S. LPG Line Proposed

INTERPROVINCIAL Pipe Line Co. has waded into the controversy over Alberta's LPG with an offer to push its Superior, Wis., branch line into Chicago.

The offer followed a hearing by the Alberta Conservation Board on a Hudson's Bay Oil & Gas, Ltd., proposal to build a condensate-gathering system in Alberta.

Hudson's Bay was the fifth company to lay such a plan before the board. All five applications await a decision.

Whether it was planned or not, Interprovincial's offer to extend its line tended to back up the Hudson's Bay request and its market estimate. Hudson's Bay said its proposal would add a southern outlet to those already available to Interprovincial in the east and to Trans Mountain in the west.

Interprovincial's proposal hinges on the assurance of a market and compliance with U. S. import rules.

The company said its rates for delivery to Chicago would be competitive with any other pipeline's charges. And it claimed enough capacity to handle estimated market requirements for the next year or two.

Much of the opposition to the Hudson's Bay proposal was based on a claim that it would be the first step in a long-range plan for U. S. control of a large part of Alberta's condensate production. Continental Oil Co. owns a big part of the shares in Hudson's Bay.

In defending its proposal, Hudson's Bay said the project was among the least ambitious of the five before the conservation board. The company said its capacity of 11,000 to 16,000 bbls. daily would be enough for the area it would serve during the next 2 years. This area includes the Waterton, Pincher Creek, and Lookout Butte fields.

Hudson's Bay would deliver condensate to the Aurora Pipe Line system at Carway, near the U. S. border.

The Hudson's Bay application estimated that 42,300,000 bbl. of condensate would be available from the fields it would serve in the next 26 years.

Earlier applications to build a gathering system were filed by Hydrocarbons Pipeline, Provincial Products Pipe Line, Westalta, and Britamoil.

A Strong Defense of Marketers—by a

Bryan—Marketers' Fan

OUT OF HIS 37 years in the oil business, William W. Bryan draws the conclusion that the gasoline salesman is one of the business world's most valuable citizens.

Bryan should know. He has vast experience in marketing for Standard Oil (N. J.), serves as a director of the Asphalt Institute, holds a membership on the API's general committee on marketing, and is a former OIIC chairman for New Jersey.

The newly named vice president of Esso Standard, Eastern Region, tells all comers that marketers have been doing a great job. And he's quick to add his conviction that they're going to remain out front in the ranks of businessmen.

He can quote some statistics to back up his arguments.

"We get a hundred letters of commendation for every one of complaint," Bryan declares. "That is not the record of an industry that is not providing service."

"Our industry provides more free service to the customer, in relation to product value, than any other business—and in the most gracious manner.

"'No other commodity in widespread distribution in the country has such complete customer confidence, is delivered more efficiently, or at a lower relative cost than is gasoline.

"Neither marketing nor refining need apologize for its record in recent years."

For a look at the background of marketer Bryan and some more of his views about the industry, see p. 222.

VETERAN marketer William W. Bryan speaks his mind on some aspects of gasoline selling. Bryan has just been named vice president of the new Esso Standard, Eastern Region of Humble Oil & Refining Co. Here's the Bryan interview with Gene T. Kinney, the Journal's East Coast Editor.

Q. There has been criticism of gasoline-marketing methods on the grounds that they are somewhat archaic. What is your feeling about this?

A. Fundamentally, this industry is sound. The customer comes after the product. It is handled in bulk from well to gas tank and is dispensed at service stations that are as far advanced in design and mechanical equipment as any other retail business, including the supermarket. Almost the only complaints we receive arise from other branches of the industry itself.

There is too much said, and with too little basis, about the shortcomings of refiners and marketers who are in circumstances beyond their control. They have progressed along with the rest of the industry in better products, better facilities, and better distribution. Had it not been for cost-reduction programs, and more efficient methods, we would indeed be in a serious situation for manufacturing or marketing profits.

Q. Specifically, what has the marketer done to keep up with the times?

A. Among other things we have instituted the degree-day system for heating-oil accounts, providing for automatic delivery. And we have created national credit at no cost to the customer.

Q. Is there any basis for dealer and distributor criticism of supplier practices?

A. Overbuilding of service stations is a complaint that is justified. But its alternative is worse. It is one of the defects of free enterprise that we must live with. We

. . . and Some Frank

WHEN a major company is invited to appear before the New York Society of Security Analysts, its top executives usually are grilled by these experts in investments. Such was the case with Texaco Inc. Here are some questions posed by the analysts, and the answers given by Texaco Chairman Augustus C. Long.

Q. Mr. Long, do you foresee any improvement in the number of allowable producing days in Texas during 1961?

A. There might be a few more producing days next year than this year. I think Texas was at the bottom in 1960.

Q. With competiition being what it is, do you expect still more mergers and a resultant decrease in the number of oil companies?

A. Mergers can be a good thing. It is a shame that the Texaco-Superior merger was stopped on the pretext that was used (that it would tend substantially to lessen competition). Companies with markets are going to do better in the future than companies without markets. (The merger would have assured markets for Superior.)

Top Marketer

look hard at each service-station investment. Each station must stand on its own.

Marketing and refining are not subsidized by other departments. At Esso we operate on a functional profit and loss system. The refiner pays the posted price for crude and bills products to marketers at the wholesale price. In Esso refining and marketing is profitable, but not as profitable as we should wish. We have always made a marketing profit based on going wholesale prices for products.

We are constantly reviewing price information to determine the proper price levels. The whole industry is seeking ways and means of improved profits, which all recognize are too low.

Q. What about the effects of price wars?

A. We are concerned with price wars. We are experimenting with means of coping with them. We are particularly interested in Mobil's wide-area pricing. Esso has found somewhat similar plans to be effective in price-war situations in some areas in the past.

As competitive as marketing is, naturally there is a lot of pressure and many dealers and distributors feel that pressure. This is, I'm sure, the cause of many government investigations. A less-competitive industry would not have these problems, and therefore would not have these complaints.

However, the greatest thing we have to be thankful for is that this is an industry where we are free to fight for the customer's dollar through lower prices and better products and services.

Q. What is the prospect for stimulating demand for oil products?

A. I am hopeful that the API's efforts to increase gasoline consumption with the program of promoting automobile travel will bring forth results. It is an excellent idea, well worthy of wide industry support.

In addition, we are emphasizing merchandising and advertising activities to promote oil heat.

Considerable effort is necessary by the whole industry—not just the marketing segment—to see that asphalt gets a better share of the interstate highway program. Funds available for promotion of asphalt are so much less than for Portland cement. The promotion of asphalt is for the benefit of marketers, refiners, producers—for all of us. Yet promotional funds come out of marketing profits, although when we sell a barrel of asphalt, we are in effect selling crude oil, too.

Q. What else is being done in this field?

A. Besides promotional efforts, Esso and others are conducting research to develop more efficient oil burners to compete more vigorously with natural gas for the home-heating market. We are also working on new devices (such as air conditioners) that will consume oil. One recent development may open a new market for heavy fuel oil, and natural gas as well, in blast furnaces to increase iron-making capacity and efficiency.

Esso has done considerable work to develop asphalt as a mulch which, when laid in strips on arid land, would cut evaporation and conserve enough moisture to support crops adjacent to the mulch.

Q. What is the outlook for marketing and marketers?

A. The indicated annual increase in consumption is 1 to 3% for the next 10 years. We need to work to return the growth rate to the 4 to 5% range, and the programs I mentioned before should contribute toward this goal.

As for marketing and marketers, you can not overestimate their importance to the industry, either as the cash-register end or as a developer of personnel. Ours is the battlefront, the place where the money is taken in.

It is challenging and develops people, especially those in front-line sales. They are on their own, and of necessity develop initiative and resourcefulness, thus becoming very valuable to their companies.

I would say that ours is a fine part of the business to be in, and a fine place for a young man to start.

Answers by Texaco Chairman Gus Long

It was a good deal for the country, a good deal for Superior, and a good deal for Texaco.

Q. Will increased competition in the oil industry provide fuel for the Roosevelt divorcement bill to divest integrated companies of marketing facilities?

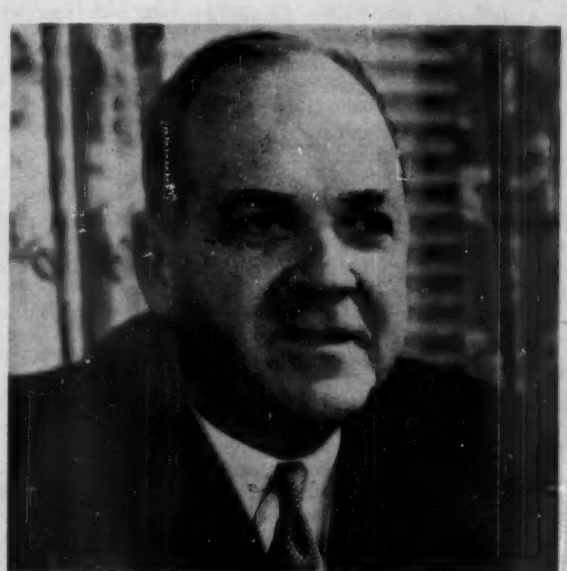
A. There will always be a place for the small businessman in our country. If the big companies haven't engulfed them already, the new national marketers aren't likely to be any more effective. We welcome them into the field.

Q. What will Texaco's 1960 earnings amount to?

A. I can't say until we make our annual report to stockholders. But the first 9 months were good (up 6.5%), the tenth month was good; we expect one of our best years.

Q. How does Texaco manage to stay above the industry average in income and even at times go counter to downward trends?

A. We represent an almost unique position in the oil industry (with respect to world-wide balance). On every



project that we spend money, we check payout very carefully. In this business you've got to be able to compete with anybody, I don't care who he is. You can't be undersold. You have to market in such a way as to match any competition.

Q. Do you expect the super gasoline station to follow the pattern of the supermarket?

A. There is a tendency for motorists to go where they can get full and complete service. This trend won't become as extensive as in the grocery supermarket, but we'll have fewer, bigger, better stations that will be less expensive to the company.

Q. Do you expect price stability in the future?

A. I don't see why, with an increase in consumption (world-wide) of a million barrels a day, that the industry can't exercise enough price discipline.

Q. What is the market outlook in Europe in particular?

A. The market in Europe has been depressed for some time. But in northern Italy, around Milan where consumption is increasing rapidly, the market has a good chance for improvement. Consumption is increasing at a rapid rate in France, Germany, and England as well.

I expect prices to harden except when upset by Russia, and Russia won't do that in all countries. The situation in Europe is somewhat improved over what it has been.

Q. Is there any danger that the depletion allowance for foreign operations will be cancelled?

A. It would be a great danger if the rate is tampered with in any respect. Why take away foreign depletion? It has guaranteed this country a position in foreign oil that we should be proud of. If foreign depletion goes, the next step might be to take away the domestic allowance.

Q. Would you break down Texaco earnings by geographical areas?

A. Our profits by hemisphere are Western, 70%, and Eastern, 30%.

Q. Do you expect any change in the relationship of profit sources?

A. If anything, the percentage of total profits made in the Western Hemisphere will increase. It might go to 72% to 75%. It has been our policy established some years ago to take a large percentage of dividends from Eastern affiliates for reinvestment in the Western Hemisphere.

Q. What is Texaco's position on a black list of tanker operators who participate in the Black Sea trade (as a result of Cuban seizure of Texaco, Shell, and Esso refineries for refusal to refine Russian oil)?

A. We do not advertise our policies in the newspapers or anywhere else. We don't feel such announcements do any good. Naturally, we are not going to do business with people who are trying to cut our throats.

Q. Are you worried about Venezuelan operations in view of current press reports?

A. We are not overanxious about the Venezuelan situation. The situation has changed in the past several years. But I believe Venezuela realizes the importance of the oil and the markets that the major companies provide and won't disturb them in their own best interests.

Q. There have been nationalization threats in Indonesia (where a Texaco and Standard of California affiliate, Caltex, produces some 225,000 bbl. daily). Are these serious?

A. The Indonesian situation is not as bad as has been reported. We can say nothing further as we are now in negotiations and have representatives there. However, we have received certain assurances from Indonesia.

Q. What will be the result of the increasing number of new companies entering foreign operations?

A. It will be very difficult if not almost impossible for new companies to break into foreign markets. The newcomers are learning just now what we have known for years. You don't establish markets by putting a representative in London, having him go to a few luncheons and meet a few people.

Q. What is the status of liquefied methane in foreign operations?

A. We have not gone into that very thoroughly. It is still experimental. However, we are watching it and are interested in the developments by Constock (which has made experimental tanker shipments from the U. S. to Europe). There are complications. We ourselves have a ship fitted out by an affiliate.

Gas Pool Lures 10 Pipelines

- Companies show interest in marketing plan for shut-in reserves over a 13-county area of West Central Texas.

THE NATURAL-GAS committee of the West Central Texas Oil and Gas Association has revealed the names of 10 pipelines interested in the gas-reserves pool sponsored by the association.

The committee advised gas producers in a 13-county area that it had met with representatives of the 10 firms.

The prospective buyers are Bend Arch Gas Co., Cities Service Gas Co., Coastal States Producing Co., Lone Star Gas Co., Northern Natural Gas Co., Oil Field Management, Inc., Texas Central Gas Co., Texas Southwestern Gas Corp., Union Texas Natural Gas Corp., and Transwestern Pipeline Co.

Announcement of the company names was the latest development in a drive by the operators to get a market for large-scale gas reserves now shut-in (OGJ, Nov. 14, p. 28 and Nov. 28, p. 41).

Prospects good . . . In a report to producers last week, the committee said it feels that an improved gas market for the area is virtually assured unless:

1. The reserves prove to be too scattered for economical gathering, or

2. Participating operators contract with a pipeline before the committee can complete its study and make its final recommendation. No pipeline can put over its project, the committee cautioned, unless it has the full support of all operators with uncommitted reserves.

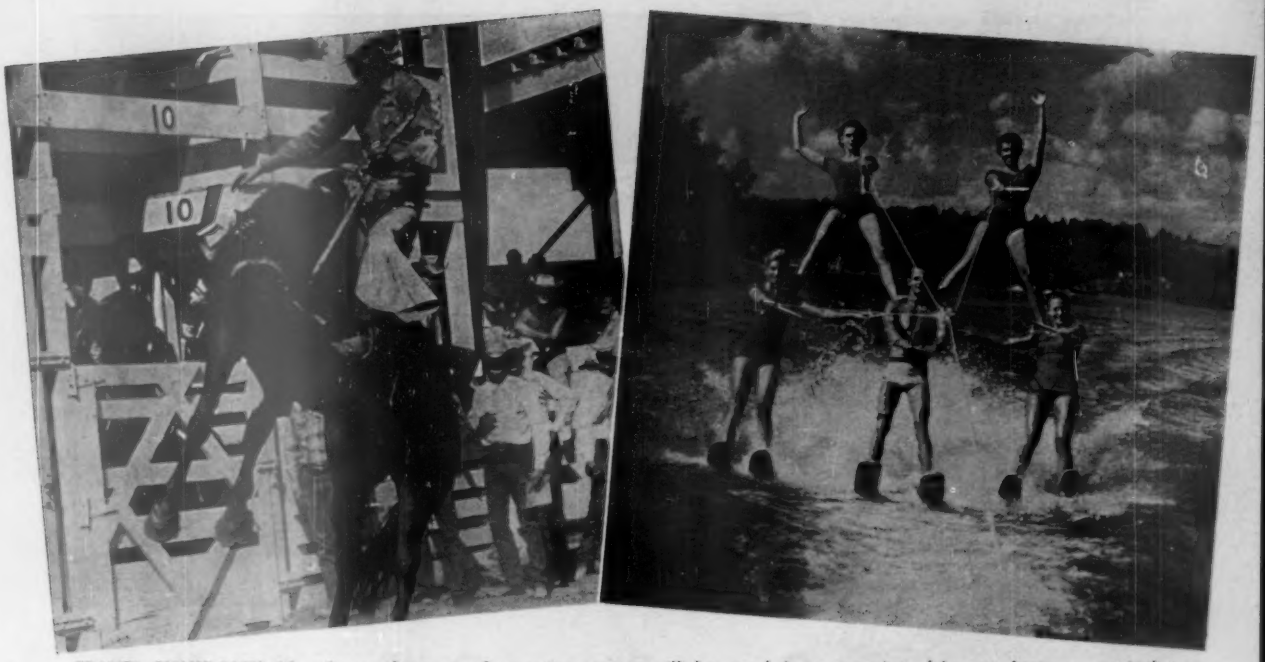
Proposals sketched . . . The committee disclosed general terms of what it called "two of the most attractive proposals"—one from an intrastate firm, the other from an interstate company.

The project outlined by the unnamed interstate line calls for a main gathering system extending from Coleman and Brown counties northeast to the area of Palo Pinto and Parker counties. It would require a reserve of 60 billion cubic feet.

Initial take would be 75,000,000 cu. ft. daily, increasing gradually to 200,000,000 in 1964.

The pipeline proposed a 14-cent price at the wellhead with "normal" escalation and a take-or-pay clause.

The intrastate proposal would provide an initial take of 73,000,000 cu. ft. daily, increasing to 238,000,000 in 1981. Price would be 13.2 cents per M.c.f. at the well with "normal" escalation.



TRAVEL STIMULANTS like these glimpses of vacation spots will be used in a massive drive to increase motoring.

New Marketing Pitch

Broad Travel Promotion Planned

THE INDUSTRY'S first truly bold bid to "expand the demand" for gasoline will be made during 1961.

The move marks a dramatic switch in attitude on the part of many marketers, who have been pessimistic about their ability to promote pleasure driving and thus reverse the decline in consumption per auto. Their defeatism arose from the feeling that the phrase "pleasure driving" was self-contradictory.

Now, sufficiently alarmed at the flattening of the gasoline-demand curve, the industry is taking its cue from the airlines and railroads. These competitors of auto travel have successfully stimulated business through travel promotion for years.

Convinced that a similar campaign can boost gasoline sales, the American Petroleum Institute is developing a massive strategy on the idea that the motorist can be persuaded to use his car more. The program will be pushed in several directions.

Newspaper travel sections . . . What amounts to the big kickoff of the campaign will be perhaps the year's largest single newspaper promotion in the United States.

The API travel development committee has mailed kits containing feature material for a complete auto-travel section to run in 100 leading newspapers on May 21, 1961. Well-illustrated travel articles are designed to whet the motorist's desire to see America's playgrounds and historical shrines for himself—by auto. The articles will be backed up by strong advertising support using the same appeal.

The American Newspaper Publishers Association has endorsed the promotion. Its business success has been assured by response from oil and allied industries, particularly automobile, and others with a big stake in tourism. It will be tied in with a push to make the third week in May "vacation planning week."

The largest trade publication in the retail field, Women's Wear Daily, in its January 24 issue will urge a year-round travel program for retailers and will plump for travel displays in department-store windows. It will also encourage retailers to tie in with the May 21 auto-travel sections.

"This should be the biggest promotion of 1961 in the newspaper field," reports James G. Bennett, API travel development coordinator and sparkplug of the campaign.

The industry will in effect gain a sizable portion of advertising budgets which run into hundreds of millions of dollars over the year.

Company campaigns . . . Some oil companies are turning from the traditional hard-sell competitive-brand promotion toward a softer sell designed to stimulate motoring.

Notable examples are Sinclair Oil Corp. and Ashland Oil & Refining Co. Such companies and the API encourage this type of effort by others.

Ethyl Corp. obtained a big response from its "Magic Circle" advertising, which urges motorists to explore interesting points around their communities. The campaign has seen ads in national magazines, Sunday newspaper supplements, 200 city newspapers, and 150 small-town dailies and weeklies.

Travel-boosting advertising plans have been forwarded to the API from General Motors, Ford, Studebaker, American Motors, Goodyear, and others.

Several companies have produced movies to supplement the advertising

drive, enlisting dealers and employes in auto-travel promotion. The Du Pont Co.'s "Highway Holiday," premiered at the API in Chicago last month, was described by the travel development committee as "a striking and dramatic contribution to expand the automotive-travel concept."

Tidewater Oil Co. leads in internal promotion. Robert G. Reed, III, assistant general manager of Tidewater's Eastern Division, plans to merchandise the API's "sell travel" program at dealer meetings in the spring. Employe and dealer support will be sought through company publications.

API advertising . . . For all the promotion, is there any assurance that people can be impelled to drive more and thus burn more gasoline?

The deluge of visitors to resort areas featured in this type of advertising is evidence that the motorist can be reached through the proper appeal.

To pin down the right approach, Ethyl made a psychological study on why people do or do not drive their cars. A report of the results will be made available to the industry early next year.

The travel development committee will use the study report in designing a pilot campaign for market-testing an advertising strategy in the spring. Response to the pilot advertising will provide the basis for a recommendation to the industry at the API Division of Marketing's mid-year meeting in Miami.

The culmination is expected to be an advertising appropriation by the API.

Other industry efforts . . . While trying to sell pleasure driving, the industry is working to remove physical and psychological deterrents.

The API supports efforts in several states to obtain calendar reform. Proposed legislation would establish eight to ten 3-day week ends each year.

The National Association of Travel Organizations reports that a survey of business firms shows 90% favor the calendar changes, which would open up more motoring opportunities.

State petroleum councils are feeding to congressmen the millions of petitions signed by motorists urging that the 1-cent emergency federal gasoline tax be allowed to die on schedule June 30, 1961.

When the interstate highway program gets rolling enough to help relieve congestion, another motoring deterrent, promotional efforts may succeed in tilting per-auto consumption upward once more.

Puget Sound Drilling Studied

A WILDCAT program may be started in the Puget Sound area of Washington, an oil-producing state which is just barely in the producing column.

Standard Oil Co. of California has a seismic crew working on Whidbey Island in the sound and may start a well "if the results of the seismic survey are successful and if sufficient acreage is leased." The southern tip of the island is about 20 miles north of Seattle.

California Standard is no newcomer to the area. The company drilled a 7,500-ft. dry hole in the Greenbank area of the island in 1958. Results from the 1958 well along with information from other dry holes drilled in the area led Socal to start the seismic work.

Whidbey Island is about 100 miles northeast of the Grays Harbor area, where Sunshine Mining Co. owns the state's only production at Ocean City field. Sunshine is making about 4 to 5 bbl. daily from its 1 Medina, the discovery well (OGJ, Dec. 5, p. 155).

Sunshine and Cascade Gas Co. are drilling three wells in the Grays Harbor area and earlier this month abandoned the 1-A Oscar (15-18n-12w) at 4,137 ft. due to drilling difficulties. The 1 Oscar is waiting on a service rig for production testing at 5,270 ft.; it also is in Section 15.

The operator is running production tests on the 1-A Rayonier (24-20n-12w), which has been drilled to 6,500 ft. The 1 France (14-18n-12w) is drilling ahead below 1,800 ft. The wells are located in Grays Harbor County

Oregon tidelands . . . Shell Oil Co.'s bid to lease the entire Oregon tidelands was stymied last week when the Oregon Land Board decided it doesn't have authority to lease the tidelands.

The board has recommended legislation be presented to the legislature during the 1961 session which will spell out the procedure for leasing offshore land.

Shell has offered to lease the 600,000 acres of tidelands for an annual rental of $150,000. The offer carried a commitment to drill 7,000 ft. of hole within 2 years.

Oregon is rank wildcat territory, and last week's action means it will stay that way at least until the 1961 legislative session.

Queensland Rights Shifted

CORDILLERA MINING CO. has agreed to assign its 6,000,000-acre concession in Queensland, Australia, to subsidiaries of Continental Oil Co., Ohio Oil Co., and Amerada Petroleum Corp.

Cordillera President Robert P. Creson said in Dallas last week that the agreement reimburses his company for all acquisition and exploration costs. And the company retains a 25% working interest in the concession.

Creson said the working interest is convertible to a 7½% net-profit interest at Cordillera's option.

Major Italian Strike Rumored Off Iran

• Oil world buzzes with reports that Enrico Mattei's company is testing a 16,000-bbl. daily well in a Persian Gulf drilling enterprise. A big-scale find in the area might mean some changes in the Italian oil czar's policies.

THE Persian Gulf marine-drilling operation off Iran furnished the world's oil industry its hottest rumor last week—a report that Enrico Mattei's Italian company is testing a 16,000-bbl.-daily well.

The report could not be confirmed late last week. True or not, it set a record for circulation within the industry.

First hints came out of Iran. Within hours they were being discussed throughout the United States. The Italians themselves were silent.

SIRIP, the operating company owned on a 50-50 basis by National Iranian Oil Co. and the national Italian AGIP Mineraria, has been testing Barganshar No. 1 for weeks from a fixed platform more than 6 miles from shore in 23 ft. of water.

While testing was being carried out, the Italians started on a deviated hole from the same platform. The second well last week had reached 6,885 ft. There was a heavy loss of mud at the bottom of the hole, indicating a highly porous formation had been reached.

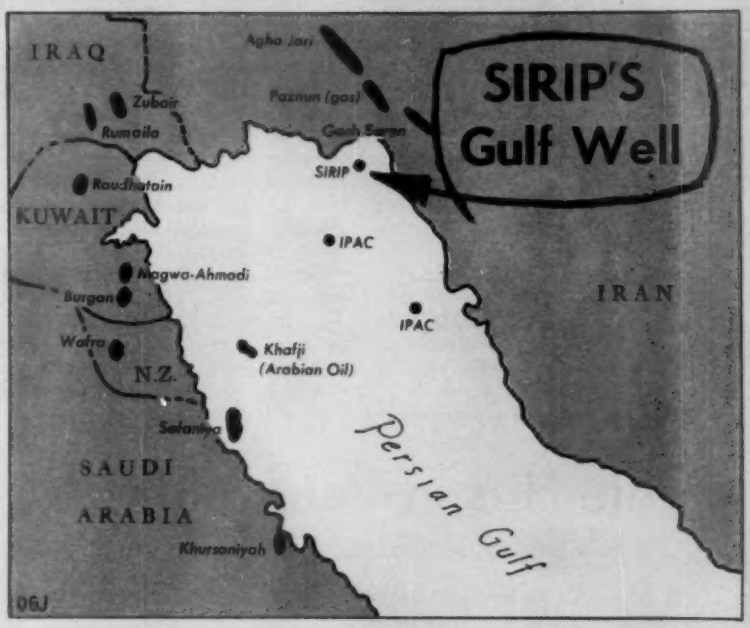
It wasn't clear whether the 16,000-bbl. flow figure being bandied about applied to the first or the second well. Previous tests of the Asmari limestone found in the first well at about 6,800 ft. indicated a productive capacity of about 3,500 bbl. daily.

With the newer well drilling into that same depth and with information about the whole operation so scanty, there was widespread speculation that the Italians may have made a real "Middle East" strike in the second hole.

The Asmari limestone is one of the Middle East's most prolific producers. This Olig-Miocene zone furnishes all but a very small part of Iran's onshore production of more than 1,000,000 bbl. daily.

SIRIP began testing the first Barganshar hole at midsummer, just about a year after the well was spudded. The company has never officially disclosed the results of any of the tests, but it has been common knowledge in the industry that oil was found at several intervals.

The well was carried to below 11,000 ft. and 5-in. casing set at 9,660 ft. But the best tests were made up the hole in Asmari between 6,800 and 7,400 ft.



In the recently published annual report of Ente Nazionale Idrocarburi, Italian parent oil company, it was only said that the well "showed some interesting results."

Pan American tests . . . To the south of the SIRIP offshore concession, Iran Pan American Oil Co. (IPAC) is testing both of its initial wildcats.

Like the Italians, Pan American has been tightlipped about what it found in a joint operation with the Iranian national company. Last week a company spokesman conceded "we have an oil well" in the first test, but said the find has not been properly evaluated.

Testing on this well, A-1, is still going on. The well went to below 13,000 ft. in 126 ft. of water about 41 miles west of Kharg Island.

Pan-Am disclosed last week that special acid pumps have been flown to the second wildcat, B-1, which is 21 miles south of Kharg Island in 142 ft. of water. This test also is in the 13,000-ft. class.

Italian success? . . . If, as rumor had it last week, the Italians have been able to find a sizable oil field off Iran, it would serve to vindicate Mattei's controversial deal with the Iranians to obtain the concession.

The Italian national oil company chief startled the oil world when he offered the Iranians a half interest in his operation in return for the concessions. The deal spawned the so-called 75-25 profit split because successful production will mean that Mattei will first divide with his partner and then again with the Iranian Government.

If SIRIP has found commercial production on a Middle East scale, the find might temper Mattei's recent efforts to buy oil from the Russians to meet fast-rising Italian consumption. However, at the price Russians are selling oil to Mattei's company, the Italian oil czar might find it cheaper to buy from the Soviets than to try to produce Middle East oil profitably.

Union Leaving Latin America

• Company will concentrate on Australia, where it had a gas show in a wildcat, and in the Spanish Sahara.

UNION OIL CO. is swinging around the globe from Latin America to the Eastern Hemisphere in its foreign exploration program.

The company has decided to concentrate its foreign efforts in Australia and the Spanish Sahara after some disappointing results in Argentina, Guatemala, and Costa Rica.

Union disclosed last week it is temporarily abandoning its search in Argentina after drilling nine dry holes on a 4-million-acre block in the Comodoro Rivadavia area. The company holds exclusive drilling rights on the big wildcat tract, but has failed to come up with commercial production.

Dudley Tower, Union president, said some of the wells "might have made small producers," but the flow wasn't big enough to justify laying a feeder line to pick up the production.

The Union acreage is north of a block held by Pan American International Oil Co.

Union also plans to curtail its drilling for the present in Guatemala, where it has contributed to several dry holes. No further work is planned in Costa Rica unless a wildcat under way turns up something commercial. The Costa Rican test is being drilled on acreage held 50-50 with Gulf Oil Corp.

While results have been discouraging in the Latin American program, Union has had some encouragement from its first test in Australia. And a wildcat program will start soon in the Spanish Sahara.

Here's how things stand in these two areas:

...**In Australia,** Union has had a gas show in its 1 Cabawin, a 9,935-ft. wildcat. Union says the show is encouraging, but the company is far from classifying the well as a discovery. However, work is continuing

A fishing job is holding up further tests. Union has been fishing for over a week. Progress is being hampered by lack of equipment and supplies at the remote location.

A company spokesman said the gas kick apparently came from the bottom of the hole.

The Cabawin wildcat is the first test of a 40-million-acre concession in the Surat basin of Queensland. Union, with 40% interest in the concession, is operator. Kern County Land Co. and Australian Oil & Gas Corp. own the concession with Union.

The Union well is about 100 miles southeast of a gas discovery made earlier this year by Associated Australian Oilfields.

...**In the Spanish Sahara,** a rig is being shipped from France to spud a 13,200-ft. wildcat. The test will probably be spudded in February.

Union and its Spanish partner, Cia. Iberica de Petroleos, hold rights on Blocks 1, 2, and 8 in the northern part of the Spanish Sahara. The blocks total 1,750,000 acres.

Camay International Drilling Co., Los Angeles, has the contract to drill the first test.

Creole Hits in Venezuela

. . . with a wildcat that broadens Aguasay trend. It's the first of several evaluation wells mapped for the area.

AGUASAY TREND in eastern Venezuela has been further enlarged by a successful Creole Petroleum Corp. wildcat.

The company's Acema 1, drilled on its 89,000-acre Acema concession in the state of Monagas, has tested oil production from four zones. The well is about 3 miles south of Sinclair Oil's East Aguasay 2.

The wildcat was taken to 13,207 ft. through the sands of Oficina formation. The first sand tested, S-4, flowed at a rate of 1,985 bbl. daily through a ½-inch choke, with a gas-oil ratio of 857:1. The crude is 24.9°-gravity.

The remaining three oil zones are R-1 sands. Sand 8 tests 977 bbl. daily of 31.3°-gravity crude through a ¼-in. choke, with a gas-oil ratio of 977:1. Sand 7 tests 1,303 bbl. daily of 31.3°-gravity crude through a ⅜-in. choke, with a gas-oil ratio of 648:1. Sand 4 tests 1,556 bbl. daily through a ½-in. choke, with a gas-oil ratio of 656:1. The crude is 31.2°-gravity.

Depths of the pays were not disclosed. Basic sediment and water content is low, ranging from 0.1% in S-4 to 1.2% in Sand 8 of the R-1 section.

The well will remain capped and the sands plugged until surface field facilities are installed. It will eventually be completed as a dual producer in the S-4 and R-1 sections.

Acema 1 is the first of several evaluation wells Creole plans on the block.

Sinclair's East Aguasay 2 is the easternmost well of an east-west producing trend that extends more than 30 miles across Monagas and Anzoategui. The well was completed as a 1,352-bbl.-daily dual producer. Both zones lie below 14,000 ft. (OGJ, Dec. 7, 1959, p. 100).

Japan Tying Imports to Fuel-Oil Demand

THE JAPANESE Government plans to start gearing its oil-import program to local demand for fuel oil.

Under this setup, enough crude will be imported to allow Japanese refiners to supply the entire fuel-oil market. This will cause a surplus of gasoline, which ranks behind fuel oil in sales.

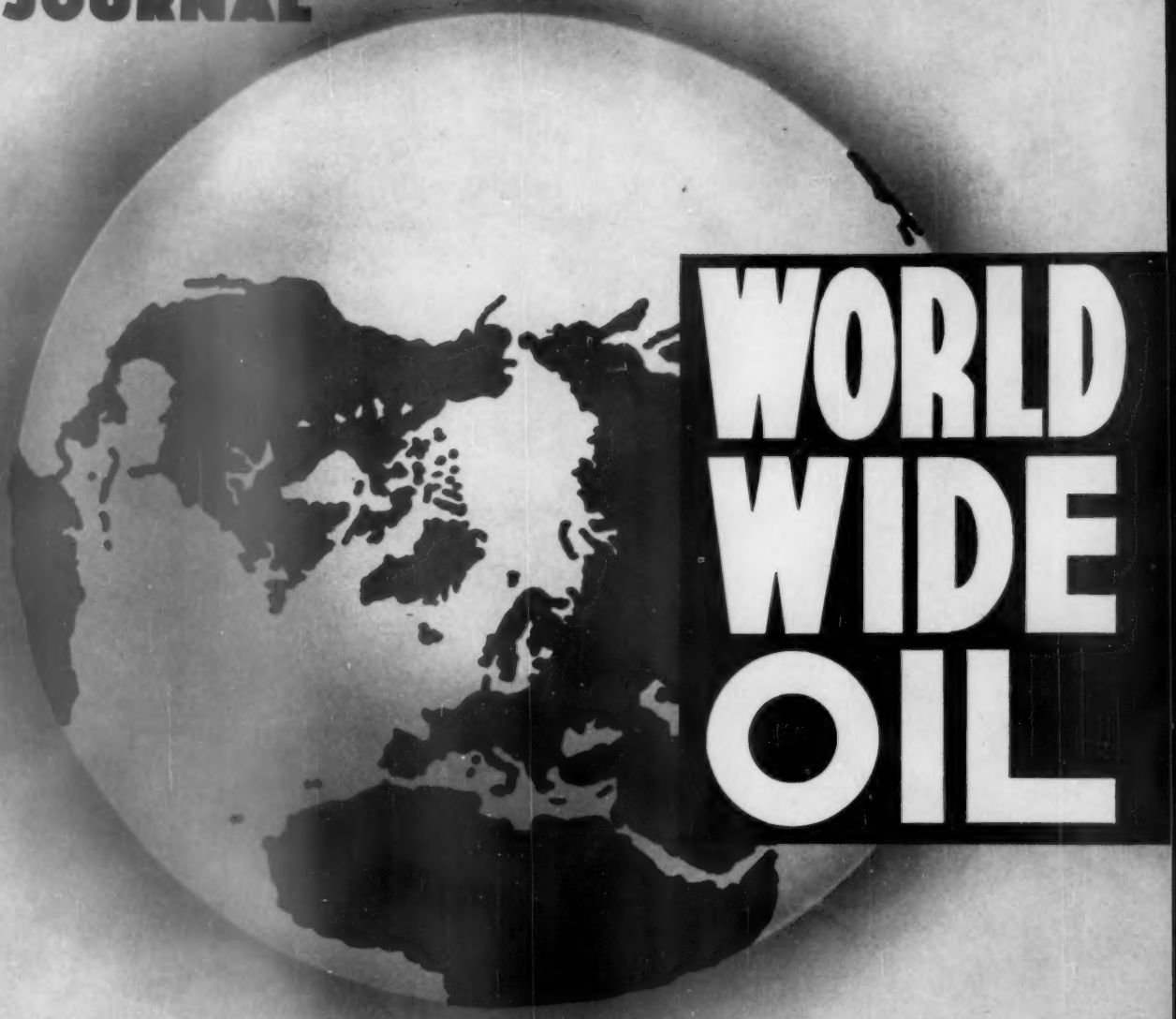
Japan now ties imports to gasoline consumption. It admits only enough crude to let refiners cover all local gasoline demand. This leaves a shortage of fuel oil, and imports have to make up the difference.

The policy change is designed to increase foreign-exchange savings and to help meet demands of utilities and steel industries for cheaper fuel oil. Some groups are threatening to burn crude as fuel if fuel-oil prices aren't slashed further. The most recent cut brought fuel-oil prices down to $3.10-$3.30 per barrel, delivered. But the landed cost of crude remains much lower—$1.90-$2.70 per barrel.

Under the current import system, fuel-oil imports would move to reach nearly 100,000 bbl. daily by the end of this decade in order to close the gap between demand and the output from local refineries.

The petrochemical industry will be counted on to use more gasoline feedstocks and thus reduce the surplus of gasoline. The Government hopes that by 1970 the chemical industry will use 160,000 bbl. of gasoline daily instead of the 54,000 bbl. now forecast.

the OIL AND GAS JOURNAL



WORLD WIDE OIL

This year the eyes of the oil world were focused on the expanding markets in Europe, and new oil being found in North Africa. The summary tables, map, and country-by-country analyses which follow will bring the reader up to date on world-wide oil as the eventful year of 1960 draws to an end.

WORLD WIDE OIL

. . . at a glance

Here's a summary of 48 pages of detailed information starting on page 103. In addition to the tabulations of production and refining data, Journal editors give you short reports on the significant oil news from all the important oil areas of the world.

COUNTRY		RESERVES	WELLS		PRODUCTION		REFINING			
	Page No.	Proved bbl. (1,000's)	Producing 7-1-60	Drilling 12-1-60	Daily, 1960 (1,000's)	Change from 1959	No. oper. refrs.	—1,000 BSPD as of Jan. 1, 1961— Crude	Cracking	Reforming
Austria	103	275,000	839	9	46.4	....	7	46.6	11.3	3.6
Belgium	104	.....	.....	.....	.....	....	6	161.5	26.5	31.5
Finland	112	.....	.....	.....	.....	....	1	25.0	12.0	3.4
France	105	225,000	528	34	39.0	21.9	14	842.7	145.7	139.6
West Germany	106	500,000	3,802	100	106.0	4.6	28	846.2	112.2	126.7
Greece	109	.....	.....	.....	.....	....	1	30.0	.....	8.2
Ireland	114	.....	.....	.....	.....	....	1	40.0	.....	9.0
Italy (incl. Sicily)	109	320,000	174	36	37.0	16.7	34	818.6	65.5	130.5
Netherlands	110	250,000	389	4	36.0	6.2	3	459.0	106.0	54.2
Norway	113	.....	.....	.....	.....	....	1	2.2	.....	.....
Portugal	111	.....	.....	.....	.....	....	1	22.9	10.6	.....
Spain	111	.....	.....	6	.....	....	2	146.0	.....	25.0
Sweden	112	.....	.....	.....	.....	....	4	60.9	.....	17.8
United Kingdom	113	5,000	239	4	1.7	....	14	949.3	127.8	129.5
Yugoslavia	115	147,000	230	35	22.0	91.4	3	25.2	5.2	.....
Total Europe		1,722,000	6,201	228	288.1	....	120	4,476.1	622.8	679.0
Algeria (incl. Sahara)	115	5,200,000	246	42	174.0	522.0	....	.....	.....	.....
Angola	118	30,000	15	3	1.3	30.0	1	2.2	.....	.....
East Africa	116	.....	.....	2	.....	....	....	.....	.....	.....
French West Africa	....	.....	.....	1	.....	....	....	.....	.....	.....
Egypt	116	550,000	248	11	62.0	6.2	3	93.2	2.7	6.9
Gabon	119	150,000	109	2	15.6	8.3	....	.....	.....	.....
Gambia	117	.....	.....	1	.....	....	....	.....	.....	.....
Libya	117	2,000,000	38	35	.....	....	....	.....	.....	.....
Morocco	117	9,500	92	1	2.0	....	1	2.1	1.8	.....
Moyen Congo	119	10,000	7	1	1.0	100.0	....	.....	.....	.....
Nigeria	118	150,000	25	5	20.0	82.0	....	.....	.....	.....
South Africa	119	.....	.....	.....	.....	....	1	25.0	13.0	4.1
Spanish Sahara	119	.....	.....	1	.....	....	....	.....	.....	.....
Tunisia	119	.....	.....	1	.....	....	....	.....	.....	.....
Total Africa		8,099,500	780	106	275.9	....	6	122.5	17.5	11.0

COUNTRY		RESERVES	WELLS		PRODUCTION		REFINING			
	Page No.	Proved bbl. (1,000's)	Producing 7-1-60	Drilling 12-1-60	Daily, 1960 (1,000's)	% Change from 1959	No. oper. refrs.	1,000 BSPD as of Jan. 1, 1961 — Crude	Cracking	Reforming
Argentina	136	2,200,000	4,809	109	160.0	30.6	14	237.5	118.1	3.3
Barbados	142	.....	.....	.....	.....	.....	1	1.0	.....	.....
Bolivia	137	95,000	118	15	8.3	−4.5	3	11.2	.....	.....
Brazil	138	300,000	664	39	77.0	20.8	8	208.1	69.5	12.0
Chile	139	110,000	156	4	19.8	12.5	1	48.0	21.5	6.0
Colombia	139	750,000	2,118	14	151.0	2.9	5	78.2	60.9	.....
Cuba	140	1,800	195	0	0.2	−66.8	6	86.9	24.5	10.9
Ecuador	143	30,000	1,639	3	7.6	....	2	13.2	6.0	.....
Guatemala		.....	.....	1	.....	.....	....	.....	.....	.....
Mexico	143	2,250,000	2,224	153	275.0	4.1	7	393.0	96.0	.....
Netherlands West Indies	141	.....	.....	.....	.....	.....	2	680.0	478.0	20.0
Peru	145	375,000	2,805	11	52.0	7.0	3	48.6	7.8	.....
Puerto Rico	141	.....	.....	.....	.....	.....	2	95.2	82.4	7.5
Trinidad	146	450,000	3,214	25	116.0	3.5	3	295.0	53.0	24.0
Uruguay	142	.....	.....	.....	.....	.....	1	28.0	2.0	.....
Venezuela	147	18,500,000	9,774	40	2,835.0	2.3	15	961.8	131.2	37.5
United States		33,535,000	590,000	2,935	7,019.0	−0.5	293	10,400.0	6,945.8	1,970.0
Canada		5,000,000	17,106	165	531.9	5.1	44	1,002.3	494.7	169.7
Total W. Hemisphere		**63,596,800**	**634,822**	**3,514**	**11,252.8**	....	**410**	**14,588.0**	**8,591.4**	**2,260.9**
Australia	127	1,000	.....	4	.....	.....	6	241.0	78.5	37.2
British Borneo	127	500,000	517	2	96.0	−12.6	1	46.0	.....	.....
Burma	128	45,000	421	3	10.9	.....	2	11.1	1.7	.....
Formosa (Taiwan)	128	500	31	1	0.07	.....	1	28.0	14.0	2.5
India	129	750,000	476	8	8.4	−9.7	4	116.1	30.4	10.5
Indonesia	130	9,500,000	2,375	15	425.0	11.6	5	273.8	57.0	15.0
Japan	132	60,000	1,862	15	9.5	21.8	25	683.7	49.5	41.5
New Guinea (incl. Papua	134	25,000	48	1	4.5	....	....	.....	.....	.....
Pakistan	134	25,000	.....	5	7.6	18.8	1	6.0	.....	.....
Philippines	134	.....	.....	3	.....	....	1	26.0	7.5	.....
Timor	...	.....	.....	1	.....	....	....	.....	.....	.....
Total Australasia		**10,906,500**	**5,730**	**58**	**561.97**	....	**46**	**1,431.7**	**238.6**	**106.7**
Bahrain	120	250,000	150	1	45.1	0	1	186.5	43.3	30.4
Iran	121	35,000,000	124	14	1,050.0	11.2	3	495.0	35.0	81.0
Iraq	122	27,000,000	97	11	975.0	14.5	6	76.3	21.0	5.0
Israel	122	35,000	24	4	2.7	8.0	1	87.0	.....	20.0
Jordan	126	.....	.....	.....	.....	.....	1	6.4	.....	.....
Kuwait	123	62,000,000	342	2	1,625.0	17.4	2	220.0	.....	4.0
Lebanon	126	.....	.....	1	.....	.....	2	24.0	.....	1.4
Neutral Zone	123	6,000,000	157	6	132.0	13.5	1	50.0	.....	.....
Qatar	124	2,500,000	34	2	172.7	2.6	1	0.6	.....	.....
Saudi Arabia	124	50,000,000	201	3	1,240.0	14.1	1	189.0	15.5	26.6
Southern Arabia	126	*250,000	.....	2	.....	.....	1	120.0	.....	12.0
Syria	125	50,000	.....	2	.....	.....	1	20.0	.....	.....
Turkey	126	75,000	56	11	7.4	.....	1	7.0	3.0	.....
Total Middle East		**183,160,000**	**1,185**	**59**	**5,249.9**	.....	**22**	**1,481.8**	**117.8**	**180.4**
Total Free World		**267,484,800**	**648,718**	**3,965**	**17,628.67**	.....	**604**	**22,100.1**	**9,588.1**	**3,238.9**
Russia and controlled areas		†33,502,000	.....	.....	**3,230.0**	**10**	.....	.....	.....	.....

*Includes offshore. †Includes: (1,000 bbl.) USSR, 31,500,000, Rumania 1,000,000, Hungary 200,000, Albania 15,000, China 750,000, Czechoslovakia 12,000 and Poland 25,000.

NORWAY
SWEDEN
SCOTLAND
Glasgow
Edinburgh
Dundee
N.IRELAND
IRELAND
Dublin
ENGLAND
Manchester
London
Derby
Coventry
Duke's Wood
Cauldron
Kelham Hills
DEN
Copenhagen
Hanover
EAST
Berlin
POLAN
NETHERLANDS
Rotterdam
Arnhem
Brussels
Antwerp
BELGIUM
Dunkirk
GERMANY
Frankfurt
Cologne
Dusseldorf
LUX
WEST
Le Havre
Paris
Coulommes
Strasbourg
Karlsruhe
Stuttgart
Munich
Bavaria
CZECHOSLOVAKIA
Prague
Vienna
Budapest
AUSTRIA
HUNGARY
Atlantic
Ocean
FRANCE
Nantes
Lyon
Bordeaux
Pau
Gallician
Marseille
Lacq
SWITZERLAND
Bern
Aigle
Cortemaggiore
Verona
Trieste
Belgrade
Adriatic Sea
YUGOSLAV
Florence
Leghorn
ITALY
CORSICA
Barcelona
Madrid
Teruel
PORTUGAL
SPAIN
Lisbon
Cartagena
Huelva
SARDINIA
Rome
Naples
ALBANIA
SICILY
Augusta
Algiers
Bougie
Tunis
Oued Gutterini
Oran
Mediterranean
Rabat
Casablanca
MOROCCO
Hassi R'Mel
Hassi Messaoud
El Gassi
TUNISIA
Tripoli
Benghasi
Mabruk
Dahra
Beda
Tiguentourine
Zarzaitine
Edjele
Atshan
Tenerife
CANARY IS.
SPANISH SAHARA
ALGERIA
LIBY

OIL AND GAS JOURNAL
EUROPEAN OIL...
and where it comes from
This map encompasses the world's fastest-growing market for oil, and its greatest new potential reserves. Here lie nearly 75 % of the Free World's reserves of petroleum, and 27 % of refining capacity. Refineries are keyed to the legend on the following page.
LEGEND
Gas Fields
Oil Fields
Oil Pipelines
Gas Pipeline
Refineries
0
300
Miles
ROMANIA
BULGARIA
Black Sea
Caspian Sea
TURKEY
SYRIA
(U.A.R.)
CYPRUS
CRETE
Sea
IRAQ
JORDAN
EGYPT
(U.A.R)
Persian Gulf
Bahrain Zone
Kuwait
N.Z.
Germik
Garzan
Karatchok
Ain Zalah
Butmah
Zubair
Rumaila
Burgan
Magwa-Ahmadi
Raudhatain
Sabriya
Safaniya
Manifa
Dammam
Abqaiq
Ghawar
Khurais
Naft-i-Shah
Haft Kel
Agha Jari
Gach Saran
Alborz
Tehran
Lali
Ras Gharib
Hughada
Cairo
Alexandria
Haifa
Tripoli
Beirut
Damascus
Aleppo
Ankara
Istanbul
Odessa
Constanta
Batumi
Stalingrad
Kuybyshev
Kuybyshevsk
Warsaw
Moscow
Leningrad
Helsinki
Riga
Athens
Antalya
Eskisehir
Sofia

Key to Refineries on Journal's Map of

"EUROPE'S OIL AND WHERE IT COMES FROM"

HERE is a country-by-country list of refineries shown on the map on the preceding spread. Refineries are numbered on the map, and can be identified by using the key on this page. Principal producing fields are shown on the map by name, and pipelines are indicated.

AUSTRIA

1. A.G. der Shell, Floridsdorf
2. Mobil Oil A.G., Kagran
3. O.M.V., Korneuburg
4. O.M.V., Lobau
5. O.M.V., Moosbierbaum
6. O.M.V., Shwechat
7. Richard Van Sickle, Heusiedl/Zaya

BELGIUM

1. Albatros, Antwerp-Kiel
2. Belgium Shell, Ghent
3. Esso Belgium, Antwerp
4. Esso Belgium, Hoboken
5. Raf. Belge de Petroles, Antwerp
6. Ste. Ind. Belge des Petroles, Kruisschans-Anvers
7. Tankage & Transport, Antwerp-Kiel

FRANCE

1. Antar Petroles, Donges
2. Union Ind. Des Petrol, Gironde
3. C.F.R., Gonfreville
4. C.F.R., La Mede
5. Shell-Berre, Berre l'Etang
6. Shell-Berre, Pauillac
7. Shell-Berre, Petit Couronne
8. C.F.P.-C.F.R.-Pechelbronn-Antar, Strasbourg
9. Esso, Port Jerome
10. Esso, Bordeaux
11. Mobil Oil, Gravenchon
12. Mobil Oil, Frontignan
13. Omnium Francaise de Petroles, Chalon
14. Pechelbronn, Merkwiller
15. Shell, Strasbourg
16. B.P., Dunkirk
17. B.P., Lavera

WEST GERMANY

1. Badische, Ludwigshafen
2. B.P. Benzin, Hamburg
3. B.P. Benzin, Dinslaken
4. Deutsche Erdoel, Weitze
5. Deutsche Erdoel, Heide
6. Deutsche Erdoel & others, Karlsruhe*
7. Deutsche Shell, Godorf
8. Deutsche Shell, Hamburg
9. Deutsche Shell Mannheim
10. E.N.I. (Sudpetrol), Ingolstadt*
11. E.N.I. (Sudpetrol), Stuttgart*
12. Erdoelwerke Frisia, Emden
13. Esso A.G., Cologne
14. Esso A.G., Hamburg
15. Esso A.G., Karlsruhe*
16. Gelsenberg Benzin, Gelsenkirchen
17. Gewerkschaft D-N, Misburg
18. Gewerkschaft E.R.E., Lingen
19. Kleinholz U., Essen
20. Mineraloel & Asphaltwerke, Ostermoor
21. Mineraloelwerke Albert Sengewald, Dodenhausen
22. Mineraloelwerke Peine, Peine
23. Mobil Oil, Bremen
24. Oelwerke Julius Schindler, Hamburg
25. Purfina, Duisburg
26. Ruhrbau, Muhlheim
27. Ruhrchemie, Oberhausen
28. Scholven-Chemie, Gel-enkirchen
29. Union Rheinische Braunkolen, Wesseling
30. Wintershall, Salzbergen

*Planned.

GREECE

1. Oil Transport & Trading, Aspropyrgos

ITALY

1. AGIP, Gela
2. AGIP, Cortemaggiore
3. API, Falconara
4. Aquila, Trieste
5. Condor, Rho
6. Dalle Piane, Genoa
7. DICA, Carrara
8. Esso, Trieste
9. Garrone, Genoa
10. Getty Oil, Gaeta
11. ICIP, Mantova
12. ILSEA, Como
13. IPLOM, Genoa
14. IROM, Venice
15. Lombardia, Milan
16. Mobil Oil, Naples
17. NILO, Milan
18. IRDM SPA, Cremdna
19. Petroli d'Itali, Fiorenzoula d'Arda
20. Purfina, Genoa
21. Purfina, Milan
22. Purfina, Rome
23. ROL, Viguzzola
24. RASIOM, Augusta
25. Raff. Volpato, Milan
26. San Quirico, Genoa
27. SAROM, Ravenna
28. SARPOM, Novara
29. SIROM, Milan
30. Sta. Pet. Italiana, Fornova Taro
31. Sta. per l'Ind. del Pet., La Spezia
32. Stanic, Bari
33. Stanic, Leghorn
34. STOI, Florence

NETHERLANDS

1. BPM (Shell), Pernis
2. Caltex, Pernis
3. Esso, Rotterdam

SCANDINAVIA

1. Dansk Mineralolie fabrik, Copenhagen, Den.
2. Kalundberg Olienaffinaderi, Kalvanborg, Den.
3. Veedol (Tidewater), Kalundberg, Den.†
4. Esso, Slagenslagen, Nor.
5. Esso, Tonsberg, Nor.
6. A. B. Nynas, Nynasham, Swedan
7. A. B. Nynas, Malmo, Swedan
8. A. B. Nynas, Gothenburg, Swedan
9. Kopportrans, Sharvik, Swedan
10. Nesto Oy, Turku, Finland
11. Gulf, Stigsnaes (Copenhagen) Denmark*

*Planned
†Building

PORTUGAL

1. Salor, Lisbon

SPAIN

1. Cia Espanola de Petroleos, Tenerife, Canary Is.
2. Ref. de Pet. de Escombreras, Escombreras
3. Ohio Oil Co., Bens*

SWITZERLAND

1. E.N.I., Aigle*

UNITED KINGDOM

1. Berry Wiggins, Kingsnorth on Medway
2. Berry Wiggins, Weaste
3. B.P., Isle of Grain
4. Esso Pet., Fawley
5. Lobitos, Ellesmere Port
6. Manchester Oil Ref., Manchester
7. Mobil Oil, Coryton
8. Shell, Heysham
9. Shell, Androssan
10. Shell, Shell Haven
11. Shell, Stanlow
12. Grangemouth Pet. Ref., Grangemouth
13. Scottish Oils, Pumperston
14. B.P., Llandarcy
15. Esso Pet., Milford Haven
16. Irish Ref. Co., Whitegate

*Planned

YUGOSLAVIA

1. Rafinerijanafte, Sisak
2. Rafinerijanafte, Rijeka
3. Rafinerijanafte, Bosanski Brod

MIDDLE EAST

1. Bahrain Pet. Co., Bahrain
2. Iranian Oil Ref., Abadan
3. Iranian Oil Ref., Masij-i-Salaiman
4. National Iranian, Kermanshah
5. Iraq Govt. Ref., Basrah
6. Iraq Govt. Ref., Baghdad
7. Iraq Govt. Ref., Khanaqin
8. Iraq Govt. Ref., Quaiyarah
9. Iraq Pet., Haditha
10. Iraq Pet., Kirkuk
11. Paz Oil, Haifa, Israel
12. Kuwait Oil, Mina-al-Ahmadi
13. Am. Indep., Mena Abdulla, Kuwait
14. Getty Oil, Mina Saud, N. Zone
15. Qatar Pet. Co., Umm Said
16. Aramco, Ras Tanura, Saudi Arabia
17. Turkiye Petrolleri, Batman, Turkey
18. Syrian Government, Homs
19. Iraq Pet., Tripoli, Lebanon
20. Mediterranean Ref., Beirut
21. Jordan Oil Ref., Zarqa
22. Shell, Cal-Tex, BP, Mobil, Mersin, Turkey
23. Caltex-Turkpet, Izmit, Turkey

NORTH AFRICA

1. Ste. Cherifienne des Petroles, Morocco
2. Esso-CFP-Shell, others, Algiers*
3. Anglo-Egyptian, Suez
4. Egyptian Govt., Suez
5. Soc. Egypt. (SERCOP), Alexandria
6. E.N.I., Casablanca*

*Planned

BY PAUL SWAIN, INTERNATIONAL EDITOR, AND RAY GIBSON, DISTRICT EDITOR

Abbreviations used in the tabulations with this report

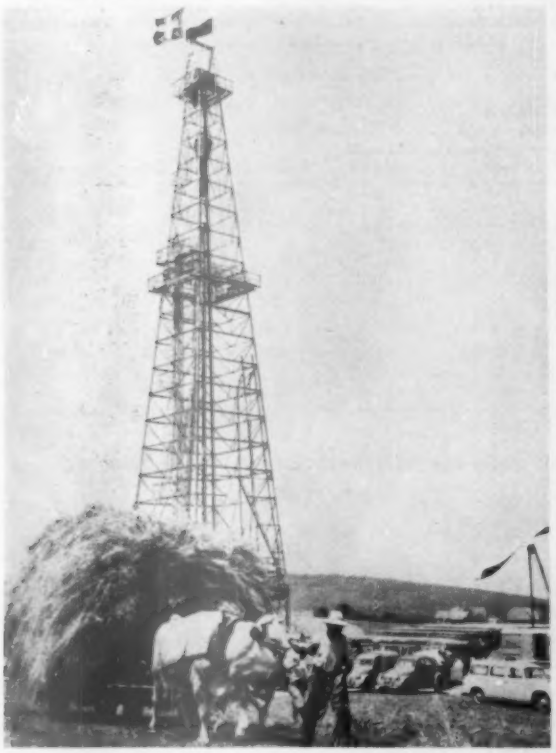
Cracking Processes:

FCC—Fluid cat cracking
TCC—Thermofor cat cracking
HD—Houdriflow cat cracking
Vis—Visbreaking
Plf—Polyforming

Other Processing:

A—Asphalt
Alky—Alkylation
BHP—BP Hydrofining
Cat—Atlantic Catforming
CH—Catalytic hydrodesulfurization
CR—Cat reforming
Fhy—Fluid Hydroforming
H—Hydrogenation
HF—Houdriforming
Hyd—Esso Hydrofining
is—Butane isomerization
L—Lube manufacture
PD—Perco desulfurization
Pf—UOP Platforming
Poly—Polymerization
Pwr.—Esso Powerforming
Rex—Rexforming
Sf—Socony
C—Coke
T—Thermal reforming
TR—Shell Trickle
SB—Sinclair-Baker
Un—UOP Unifining
V—Vacuum distillation

EUROPE



THE BP GROUP is exploring in Switzerland's Fribourg Canton through its subsidiary BP Exploration Co. This test well was drilled near the village of Courtion.

MAJOR NEW RESERVES of gas have recently been discovered in the northern Netherlands. The Ministry of Economic Affairs estimates the new reserves at 2 trillion cubic feet.

AUSTRIA

THE DECLINE in domestic crude production tapered off this year, but depletion of reserves continues to be a major problem. New output of more than 1,000 bbl. daily in upper Austria by RAG, a joint Mobil-Shell company, is partially alleviating the situation, but not enough.

Austria continues to ship a net 10,000 bbl. daily of crude to Russian satellites as reparations from World War II. This year the agreement was revised to permit Austria to ship a flat 10,000 bbl. daily. Previously, the country shipped 20,000 bbl. daily and received 10,000 bbl. daily of high-sulfur Russian crude in return. Shipments will now end in 1964, rather than 1965.

A postwar agreement with Mobil and Shell moved to the point of needing only formal government approval this year after years of negotiations. This calls for separate exploration and producing operations by

WORLD WIDE OIL

RAG and the government company, OMV. But all crude production, with the exception of shipments to Russia, will be sold to a new marketing company, owned 74% by OMV and 13% each by Mobil and Shell. This firm will sell crude to refineries owned by parent companies, and buy back finished products for redistribution among the partners. Austria also will pay RAG $13.7 million in six annual payments.

AUSTRIA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells—Flowing	No. of wells—Pumping	Production in bbl.—Daily avg. 1st 6 mos.	Production in bbl.—Cumulative	Gravity °API
Aderklaa, 1939	5,000	....	....	951	1,786,781	45
Gaiselberg, 1938	3,940	....	57	281	19,730,490	25.0
Goesting, 1934	4,800	....	....	575	1,853,440	29
Grubenfelder Neusied/Zaya, 1937	2,900	....	....	1,924	4,797,277	25.7
Matzen-Auersthal, 1949	4,500	....	....	39,296	28,104,079	19-41
Muehlberg, 1941	5,500	....	....	2,540	4,606,608	31
Neusiedl/Zaya, 1939	4,000	....	....	489	1,330,442	31
Puchkirchen, 1956	8,470	....	1	19	144,483	34.9
Ried, 1959	4,630	....	9	180	260,938	34.9
Steindlberg, 1958	6,260	....	2	16	55,587	34.5
Zisterdorf, 1937	4,760	....	16	59	5,764,840	25.5
Total		*839		46,330	68,434,965	

*Estimated.

AUSTRIA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking—Thermal	Cracking—Catalytic	Reforming	Other processing
A. G. der Shell-Floridsdorfer Mineraloelfabrik—Floridsdorf	4,500	.....	.....	.....	
Mobil Oil A.G.—Kagran	*3,400	.....	.....	.....	1,300 V, 140 L, 400 A
Oesterreichische Mineraloelverwaltung A.G.:					
Korneuburg	7,100	.....	.....	.....	310 A
Lobau	8,650	.....	.....	.....	.....
Moosbierbaum	6,000	6,000	.....	1,600 T	900 V
Schwechat	[1]16,000	5,300 Vis	.....	1,950 T	4,000 V, 500 L, 1,000 A
Richard K. Van Sickle—Neusiedl/Zaya	900	.....	.....	.....	.....
Total	46,550	11,300	.....	3,550	

*All figures on calendar-day basis. (1) Adding 40,000-bbl. crude unit, 12,000-bbl. cat cracker, and 7,000-bbl. cat reformer.

BELGIUM

BELGIUM will be an outlet for crude from the French Sahara under an agreement between SN Repal, half owner of Hassi Messaoud oil field, and the owners of Albatros refinery at Antwerp. Specific details of the arrangement for the refinery were not disclosed, but preliminary negotiations were over a long-term lease.

Esso Belgium put its 2,500-bbl. Hoboken refinery up for sale this year, in a move to cut back on less efficient equipment in the face of its major refinery-construction programs elsewhere in Europe. British Petroleum and Petrofina decided on a major expansion of their jointly-owned plant near Antwerp.

BELGIUM REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking—Thermal	Cracking—Catalytic	Reforming	Other processing
Albatros, S.A. Belge pour le Raffinage de Petrole, Antwerp-Kiel	14,000	.....	4,500 HD	.....	6,000 V, 700 Poly
Belgium Shell Co., S.A., Ghent	3,000	.....	.....	.....	530 L
Esso Belgium, Antwerp	36,500	.....	10,500 FCC	4,000 T 5,600 Pwr	2,900 V, 6,900 Hyd, 1,500 A
Esso Belgium, Hoboken	(1)	.....	.....	.....	.....
Raffinerie Belge de Petroles, S.A., Antwerp	15,000	.....	.....	2,400 T 2,500 SB	3,500 A
Ste. Industrielle Belge des Petroles, Kruisschans-Anvers	[2]90,000	.....	11,500 FCC	7,000 T 10,000 Pf	20,000 V, 10,000 BPH, 1,020 Poly
Tankage & Transport, S.A., Antwerp-Kiel	3,000	.....	.....	.....	.....
Total	161,500	.....	26,500	31,500	

(1) 2,300-bbl. plant shut down in 1960. (2) Plan additional 100,000-bbl. crude capacity, plus 20,000-bbl. vacuum unit, 9,000-bbl. Platformer, and 15,000-bbl. Hydrofiner.

FRANCE

NEARLY HALF of French demand is now offset by crude production in France, French Sahara, and Gabon, an economic boon to the country far outweighing problems involved in bringing large new crude supplies into world markets in a time of surplus.

Domestic production, with the help of a cluster of young fields in the Paris basin, is over 40,000 bbl. daily. Output from the West African country of Gabon has leveled off at 16,000 bbl. daily. The big production from the Sahara, however, is moving steadily upward with the 24-in. pipeline from the Edjele area, as well as the system from Hassi Messaoud, now in operation. This level reached 195,000 bbl. daily in September.

France is energetically trying to make room for the oil both at home and abroad. At home, in one move, the government, through Bureau de Recherches de Petrole took definite steps to gain a behind-the-scenes voice in marketing. One step was the merger of Caltex properties into a newly organized French-controlled company, Union Industrielle des Petroles (UNIP).

Facilities involved in the deal include the 25,600-bbl. Gironde refinery and a marketing organization. Tankers belonging to an affiliated shipping company also were included. Caltex, whose stockholders approved the move, got 40% interest in the new firm. A group of French firms, partly controlled by BRP, got 60% interest.

Abroad, the owners of Hassi Messaoud are seeking market outlets for their growing crude supplies. Total, the marketing arm of CFP, has picked up two more chains of service stations in West Germany, formed a marketing subsidiary in Australia, and tied down a crude sales contract in Japan. It is expected to market in Britain soon under its own brand name. The other owner of Hassi Messaoud, SN Repal, has made a leasing arrangement for the Albatros refinery in Belgium.

Nineteen companies have firm plans to open a 419-mile 30-in. pipeline system from the Marseille area to Strasbourg, France, with a 40-mile extension to Karlsruhe, West Germany, by 1963. Initial capacity will be 200,000 bbl. daily. A Shell affiliate plans a refinery in the Strasbourg area, while the French affiliate of British Petroleum is negotiating with CFP and Antar for another.

FRANCE PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells—Flowing	No. of wells—Pumping	Production in bbl.—Daily avg. 1st 6 mos.	Production in bbl.—Cumulative	Gravity °API
Bollwiller, 1958	6,000	....	....	....	1,300	....
Brie-Chartrettes, 1959	....	7	....	400	72,800	....
Cazaux, 1959	7,400-8,200	6	....	564	256,939	31.5
Chailly, 1958	....	32	....	1,329	506,740	....
Chateaurenard, 1958	1,700	6	....	368	184,451	27
Clermont, 1957	7,500	....	....	....	3,200	....
Coulommes, 1958	6,000	29	....	3,888	1,920,901	33
Donau-Soufflenheim, 1954	1,650	....	12	74	223,843	30
Eschau, 1956	2,900	1	6	87	146,339	34
Gallician, 1951	6,600	2	....	10	222,021	25
Lacq, 1949	2,200	15	15	1,697	13,528,732	22
Lucats, 1956	7,450	....	1	30	29,041	37.9
Lugos, 1956	5,000	....	6	630	728,400	20.6
Mothes, 1955	7,900	4	....	1,100	1,248,432	20.9
Parentis, 1954	7,600	19	10	21,600	41,258,320	33.8
Pechelbronn, 1813	600-4,000	4	318	431	22,899,719	27.0
Renigue, 1955	4,700	1	2	50	117,976	40
Scheibenhard, 1956	3,000	15	1	645	541,866	32
Schirrheim, 1954	1,800	....	....	....	34,700	29
Staffelfelden, 1952	6,300	....	2	25	408,479	40
St. Martin de Bossenay, 1959	4,500	3	6	2,213	544,645	30.1
Villemer, 1959	5,000	5	....	503	91,546	....
Total		149	379	35,644	84,970,390	

FRANCE REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking—Thermal	Cracking—Catalytic	Reforming	Other processing
Antar Petroles de l'Atlantique, Donges	45,000	....	10,000	13,000	400 L
Union Industrielle des Petrole, Gironde	25,600	....	5,700 FCC	4,200 T	10,600 V, 600 Poly
Cie. Francaise de Raffinage:					
Gonfreville	142,500	9,000 Vis	19,000 FCC	13,000 T	2,150 Poly, 2,500 L
La Mede	130,000	2,000	11,600 FCC	17,000 T 20,000 Pwr	13,700 CH, 1,000 Poly
Cie. Raffinage Shell-Berne:					
Berre l'Etang	75,000	4,700 Vis	11,000 FCC	11,000 T	....
Pauillac	16,500	....	....	....	....
Petit Couronne	75,000	....	12,500 FCC	8,500 T	....
C.F.P.-C.F.R.-Pechelbronn-Antar, Strasburg	(1)	....	....	....	....
Esso Standard, S.A.:					
Port Jerome	280,000	7,500 Vis	40,000 FCC	5,500 T 13,000 Pwr	34,000 V, 12,000 Hyd, 1,500 Poly, 3,500 L, 3,500 A
Bordeaux	34,000	....	....	8,000 Pwr	14,000 V, 2,500 A
Mobil Oil Francaise:					
Gravenchon	31,500	....	....	2,300 T 3,900 CR	5,000 CH, 2,300 L

WORLD WIDE OIL

FRANCE REFINING (Continued)
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking—Thermal	Cracking—Catalytic	Reforming	Other processing
Frontignan	27,000		12,700 TCC	2,200 T	
Omnium Francaise de Petroles, Chalon	(3)				
Pechelbronn, S.A., Merkwiller	4,600				
Royal Dutch-Shell, Strasbourg	(4)				
Ste. Francaise des Petroles BP:					
Dunkirk	52,000			7,000 T	13,000 V, 2,000 L, 2,000 A
Lavera	104,000			5,000 T 6,000 Pf	3,500 CH
Total	842,700	23,200	122,500	139,600	

(1) 60,000-bbl. refinery planned. (2) Adding 4,000-bbl. lube Hydrofiner. (3) 60,000-bbl. refinery planned. (4) 60,000-bbl. refinery planned.

WEST GERMANY

THE WEST GERMAN oil industry is a place of famine in the midst of plenty. Demand has risen about 27% this year to more than 600,000 bbl. daily. But both established companies and newcomers are fighting for markets, prices are low, and some of the biggest companies are operating at a loss.

Refining capacity substantially increased with the opening of Deutsche Shell's new 80,000-bbl. plant at Godorf, near Cologne; BP Benzin's 100,000-bbl. plant at Dinslaken; and Frisia's 30,000-bbl. plant at Emden, built by Gottlieb Duttweiler to operate on Aminoil crude supplies.

A 181-mile 24-in. crude pipeline from Rotterdam to Wesel was commissioned in the summer. The second pipeline into the Ruhr, a 230-mile 28-in. system from Wilhelmshaven to Cologne, began operation in 1959.

Esso and Shell have founded a joint company to build an extension of the Marseille-Karlsruhe pipeline to Ingolstadt, Bavaria, where they plan a refinery. Ingolstadt also is the terminal for a pipeline from Genoa via the Alps projected by Italy's Enrico Mattei and Bavarian bankers. Whether this final stage of the system, from Switzerland into West Germany, will be built still was in doubt late this year.

Exploration activity has slackened during the year, but there still were 105 rotary rigs in operation. Footage the first half was 1,102,400 ft., compared with 1,309,600 ft. a year earlier. Oil was found for the first time in the Rhetic zone of the Alpine Foreland. The well is good for only 45 bbl. daily on pump, but oil below the Molasse (Tertiary) in the region may stimulate drilling in southern Germany and Switzerland. There is growing interest in natural gas, and reserves are now estimated at about 875 billion cubic feet.

WEST GERMANY PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells	Production in bbl.—Daily avg. 1st 6 mos.	Production in bbl.—Cumulative	Gravity °API
Bavaria					
Albaching, 1958	8,200			5,352	
Ampfing, 1954	4,600	23	1,540	1,469,189	20
Heimertingen, 1954	5,100	7	49	162,711	33-37
Hohenlinden, 1959	4,250-7,200		7	3,280	
Isen, 1954	6,550-6,660			7,214	18
Lauben, 1959	4,750	3	74	38,305	37
Moenchsrot, 1958	4,800-4,850	10	963	463,076	
Moosach, 1959	9,650-9,700		53	24,261	
Tegernsee, 1883				32,369	
Velden, 1960		2	23	4,274	
Total Bavaria		45	2,709	2,210,031	
Emsland					
Adorf, 1948	4,150	1	47	60,194	30
Emlichheim, 1944	2,600	112	2,553	12,689,326	25
Frenswegen, 1958	1,300			270	
Georgsdorf, 1944	1,800-2,600	216	6,226	19,802,347	24-29
Hebelermeer, 1955	3,950	10	507	281,089	29-30
Lingen, 1942	2,950-3,300	257	1,761	10,114,312	30-32
Meppen, 1960	3,800-4,050	2	20	4,026	
Ruhlermoor, 1949	2,000-4,000	222	8,803	21,205,485	25
Ruhlertwist, 1949	2,350-2,900	128	3,105	9,302,008	25
Scheerhorn, 1949	3,550-3,750	100	3,385	7,199,691	30
Total Emsland		1,048	26,407	80,658,748	

WEST GERMANY PRODUCTION (Continued)

Name of field—Discovery date—	Depth (ft.)	No. of wells	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Hamburg					
Hohenhorn, 1954	7,900	.....	.....	2,939	...
Reitbrook, 1937	1,450-2,100	109	920	12,350,194	...
Total Hamburg		109	920	12,353,133	
Hanover					
Broistedt, 1937	2,450	7	118	574,866	35
Calberlah, 1945	200	.....	.....	62,217	22
Eddesse, 1896	800-2,950	65	555	4,084,240	26-34
Eicklingen, 1937	1,800	14	165	2,531,860	32-33
Eilte, 1947	3,700-5,750	27	1,302	1,214,185	23-35
Eldingen, 1949	4,750	43	1,650	6,215,794	35
Esperke, 1960	.....	1	20	3,600	...
Fuhrberg-Hambuehren, 1939	260-1,950	219	525	6,022,717	22-23
Gifhorn, 1935	1,300	10	20	416,784	16
Hademstorf, 1941	4,100	10	57	867,648	25-29
Hankensbuettel, 1954	4,450-5,100	57	7,121	11,261,914	33
Hardesse, 1957	6,050	1	26	58,220	34
Hohenassel, 1943	1,500	28	288	2,556,099	31
Hohne, 1951	4,300-5,900	45	4,405	10,691,386	33-34
Lehrte, 1952	3,750	62	1,458	2,289,594	31
Leiferde, 1956	2,600	32	2,559	2,049,358	34
Lichtenhorst-Rhaet, 1959	3,400	1	13	5,055	28
Lueben, 1955	3,950	13	1,112	1,417,969	35-38
Meckelfeld, 1938	1,000-1,300	25	797	890,844	24-32
Meerdorf, 1954	5,350-6,000	17	363	118,464	42
Moelme, 1935	1,700	14	192	1,316,390	26
Nienhagen, 1899	800-4,100	202	5,989	43,649,395	22-32
Oberg, 1918	500-850	39	86	2,815,896	36-46
Oerrel-Wesendorf-Nord, 1954	4,450	42	1,505	2,063,608	...
Rautheim, 1955	330	1	1	6,489	...
Ruehme, 1954	1,950	39	541	1,106,897	...
Steimbke, 1936	800-4,600	196	1,084	8,302,939	18-34
Stemmerberg, 1948	4,000	.....	.....	66,324	16
Suderbruch, 1949	3,750-7,550	77	2,413	10,131,160	19-38
Thoeren, 1941	1,550-4,000	49	244	2,228,150	31
Vechelde, 1954	5,750	.....	.....	663,244	31
Vorhop, 1952	2,950-6,900	17	1,757	2,032,233	36
Vorhop-Knesebeck, 1958	5,100-5,200	12	716	259,612	36
Wesendorf, 1943	1,300-5,900	65	1,287	7,526,809	17-42
Wesendorf-Sud, 1958	4,900	3	78	40,072	...
Wietze, 1879	1,300-4,900	52	442	18,813,452	16-29
Total Hanover		1,485	38,889	154,355,484	
Schleswig-Holstein					
Boostedt-Ploen, 1952	5,750	40	3,167	8,231,499	29-34
Bramstedt, 1954	6,150-6,350	19	1,314	3,222,612	34-35
Heide, 1935	3,450-5,750	76	951	14,444,545	21-32
Kiel, 1955	5,750	55	234	452,646	32
Ploen-Ost, 1959	6,400	11	1,362	451,695	36
Schwedeneck, 1956	4,900	23	1,054	671,781	25
Warnau, 1957	8,200	1	20	35,259	35
Total Schleswig-Holstein		225	8,102	27,510,037	
Upper Rhine Valley					
Beuchenau, 1959	2,250	.....	.....	1,193	...
Deidesheim, 1959	3,850-3,900	1	7	1,938	...
Dudenhofen, 1952	6,550	2	71	48,628	26-27
Eich, 1959	6,850	.....	19	8,719	...
Forst-Weiher, 1934	1,000-2,950	4	5	680,329	32-34
Graben, 1959	4,750-4,850	2	33	13,057	...
Hayna, 1957	4,500-4,700	.....	.....	14,860	39
Hofheim, 1958	.....	3	35	17,445	...
Huttenheim, 1936	5,250	1	6	27,633	31
Knielingen, 1959	4,800	2	59	23,167	...
Landau, 1955	3,950-4,800	61	2,348	2,044,858	36
Leopoldshafen, 1957	3,100-4,000	9	217	176,861	40
Maximiliansau, 1958	4,250-4,550	.....	3	6,198	...
Minfeld, 1956	2,650	10	105	133,693	...
Neureut, 1958	2,800	3	63	33,022	...
Offenbach, 1958	3,350-3,500	6	73	58,490	36
Rheinzabern, 1959	3,700-3,800	.....	.....	2,705	41
Rot, 1953	2,150	7	61	390,457	25-26
Stockstadt, 1952	5,400	25	948	2,625,758	39
Wattenheim, 1954	7,500	.....	.....	62,217	...
Weingarten, 1936	1,000-3,600	57	31	497,717	31-34
Total Upper Rhine Valley		193	4,084	6,868,945	

WORLD WIDE OIL

WEST GERMANY PRODUCTION (Continued)

Name of field—Discovery date—	Depth (ft.)	No. of wells	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Weser-Ems					
Barenburg, 1953	2,300-3,300	40	2,878	4,775,524	29
Bockstedt, 1954	3,750	16	761	858,177	
Bramhar-Wettrup, 1958	2,560-3,300	35	1,655	514,587	29
Dickel, 1953	3,450	33	368	271,689	26
Diepholz, 1957	2,600-2,850	4	103	91,384	
Dueste, 1954	2,600-4,250	202	6,486	11,256,610	
Elsfleth, 1956	5,000	16	602	553,232	24-26
Etzel, 1942	4,600			383,379	13
Hemmelte-West, 1951	3,300-4,250	48	1,956	6,788,772	32
Liener-Garen, 1953	2,450-4,250	12	99	303,731	28-31
Loeningen, 1959	3,750-3,800	2	115	22,875	34
Molbergen, 1953	2,350	20	218	605,374	26
Ortland, 1956	1,700-1,850	17	498	665,945	32
Osterwalde, 1953	4,750-4,900	40	814	954,190	
Oythe, 1956	3,750-3,800	2	14	23,089	28.5
Quakenbrueck, 1950	1,800	4	24	317,327	35
Siedenburg, 1956	2,250	21	524	470,006	25.5
Varel, 1957	5,050-5,150	10	858	309,468	26-29
Vechta, 1955	5,200-6,500	46	2,923	1,998,451	39
Voigtei, 1953	1,150-1,500	101	3,515	5,127,989	31-34
Wehrbleck, 1957	3,400	28	850	350,506	
Total Weser-Ems		697	25,261	36,642,305	
Total West Germany		3,802	106,372	320,598,683	

WEST GERMANY REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Badische Anilin & Soda-Fabrik AG, Ludwigshafen, Oppau	*1,000				210 L
B.P. Benzin und Petroleum AG:					
Hamburg-Finkenwerder	42,000	4,500		5,400 CR 3,200 T	5,600 BPH, 1,000 A, 4,900 Is
Dinslaken	100,000		11,000 FCC	12,000 Pf	13,000 BPH, 2,100 A
Deutsche Erdoel-AG:					
Wietze	800				
Heide	32,000		7,700	3,400 CR 3,400 Pf	1,600 L, 320 Poly, 7,800 H
Deutsche Shell AG:					
Monheim/Reisholz	6,000				
Godorf	80,000			8,400 Pf	
Hamburg/Harburg	60,000		11,700	7,400 CR 7,500 Pf	7,500 CH, 420 L, 35,000 CH
Erdolwerke Frisia AG-Emden	30,000			4,000 CR	
Esso AG:					
Hamburg/Harburg	54,000		11,500	6,500 CR	6,400 Fhy, 1,500 L
Cologne	72,000			7,300 Pwr	13,800 Hyd
Gelsenberg Benzin AG, Gelsenkirchen-Horst	95,000		9,700	15,900 CR	15,300 H, 950 Is, 510 Poly
Gewerkschaft Deurag-Nerag, Misburg	20,000	6,400	2,600	2,800 Pf	180 Poly
Gewerkschaft Erdoel Raffinerie Emsland, Lingen-Holthausen	53,000		18,200	6,600 CR 4,000 Pf	3,000 Hf, 770 Poly, 105 CH
Gottlieb Duttweiler, Emden Kleinholz U. Co., Essen-Altenessen	8,500				
Mineraloel and Asphaltwerke AG, Ostermoor on Kiel-Canal	5,300				5,300 A
Mineraloelwerke Albert Sengewald, Dedenhausen	*900				
Mineraloelwerke Peine, Peine	400				
Mobil Oil AG in Deutschland, Bremen-Olebshausen	32,000		7,400	3,400 CR	
Oelwerke Julius Schindler G.m.b.H, Hamburg-Neuhof	4,700				1,100 L
Purfina, Duisburg	21,000			4,000 CR	4,000 PD
Ruhrbau G.m.b.H., Muelheim	6,400				
Ruhrchemie AG, Oberhausen/Holten	10,000		4,700	1,800 CR 800 T	900 H
Ruhroel G.m.b.H., Bottrop-Welheim	*2,600				
Scholven-Chemie AG, Gelsenkirchen-Buer	42,000		5,100	9,100 CR	9,500 H, 180 Poly
Union Rheinische Braunkohlen Kraftstoff AG, Wesseling	64,000	11,700		4,200 T 5,600 CR	9,500 H, 430 Poly

WEST GERMANY REFINING (Continued)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Wintershall AG, Salzbergen	2,400	.....	.....	.....	.....
Zeller & Gmelin, Eislingen/Fils	*170	.....	.....	.....	.....
Total	846,170	22,600	89,600	126,700	

*Not operating.

GREECE

SIX COMPANIES, including Jersey Standard and Hunt International, have either undertaken exploration programs or have applied for permits. Esso has rights over the islands of Paxos, Antipaxos, and Zante, while Hunt has a permit in the Salonica area of the mianland. Others interested in Greek exploration are British Petroleum, the Greek Government, and a local company, Helios, in partnership with the French RAP.

GREECE REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Oil Transport Trading & Refining Co., Aspropyrgos	30,000	.....	.....	8,200 Cat	500 A
Total	30,000	.....	.....	8,200	

ITALY

ITALY continues in the oil-industry spotlight not so much for its internal operations as for the far-flung activities of Enrico Mattei, head of the state-owned oil company, ENI.

Mattei this year made more deals with foreign governments for exploration concessions and refining rights on terms better than those offered by most of the international majors. And, as a year ago, most of the claimed benefits are on paper only.

Most of ENI's solid prograss so far is in refinery construction. Preliminary work is under way at a plant at Aigle, Switzerland. ENI has withdrawn its one-third interest in the project. But it retains the right to transport all the crude via a pipeline from Genoa, and to make use of one-third of the plant's refining capacity.

Construction has started on a 20,000-bbl. refinery in Morocco, in which ENI has half interest, and refining agreements have been reached with the governments of Tunisia and Ghana. ENI also aspires to two refineries in Germany, one at Ingolstadt, in Bavaria, and another at Stuttgart. These are contingent on extending the pipeline system from Aigle.

ENI reportedly has made a commercial discovery in its Persian Gulf offshore concession in Iran, but few details have been disclosed. This oil would be the key to making many of the organization's plans click elsewhere, and might be an influence on other concession agreements in the Middle East. The ENI deal would give Iran the large slice of a 75-25 concession split.

The Italian company's only foreign production continues to be in Egypt, where it has an interest in Sinai output in partnership with Egypt and Petrofina. Its other concessions are in Morocco, Tunisia, Libya, Sudan, and Somalia.

Italy has been a leading buyer of Russian crude, and ENI late this year signed an agreement for the purchase of 60,000 bbl. daily over a 4-year period. The oil will be paid for in large-diameter pipe, pipeline equipment, and synthetic rubber.

Cities Service and British Petroleum are moving into Italian marketing. But exploration by private companies is at a virtual standstill. Gulf Oil, however, continues to be the leading crude producer with its output from Ragusa field, found under a more liberal Sicilian oil law. ENI continues to have more success with its natural gas than with the development of crude output, and its gas network in the Po Valley is the most extensive in Europe.

ITALY (SICILY) PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Alanno, 1956	1,700	.....	.....	.....	.....	.....
Bussefo, 1956	4,930	.....	.....	.....	.....	.....
Cortemaggiore, 1949	5,000-6,380	.....	.....	.....	.....	.....
Gela (Sicily)	10,800	.....	32	11,039	.....	8.0
Ponte Dirillo (Sicily), 1958	10,050-10,350	.....	.....	.....	.....	.....
Ragusa (Sicily), 1954	6,255	.....	49	22,318	33,376,404	19.5
Ripi, 1915	730	.....	.....	(*)	.....	.....
S. Giorgio, 1943	3,000	.....	.....	(*)	.....	.....
Tramutola, 1936	680	.....	.....	(*)	.....	.....
Total			[1]174	[1]33,357	[1]45,366,389	

*Shut in. (1) Estimated.

WORLD WIDE OIL

ITALY REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
AGIP Mineraria SPA:					
Cortemaggiore	3,000	.....	2,000 TCC	.....	.....
Gela (Sicily)	[1]2,500	.....	.....	.....	.....
Anonima Petroli Italiani (API), Falconara	[2]45,000	6,500 Vis	.....	4,700 T 3,000 Pf	4,000 V, 11,000 Un, 4,500 A
Aquila Societa Technico-Industriale, Trieste	[3]44,000	.....	5,600 TCC	3,000 T 5,000 Pf	5,000 V, 5,000 Un, 5,000 TR, 500 Poly, 1,000 L, 2,000 A
Condor SPA per l'Industria Petrolifera y Chimica, Rho	34,000	.....	15,000 TCC	5,100 Pf	6,000 CH, 400 Poly
Dellepiane, Genoa	1,500	.....	.....	400 T	.....
Distilleria Italiana Catrami (DICA), Carrara	9,200	500	.....	.....	.....
Esso Standard Italiana, Trieste	6,500	.....	.....	1,000 Pwr	1,300 V, 560 L, 500 A
Garrone, Genoa	25,800	.....	.....	5,600 Pwr	2,000 Hyd, 300 L, 450 A
Getty Oil Italiana, Gaeta	40,000	.....	.....	3,000 Pf	.....
Industria Chimica Italiana del Petroleo (ICIP), Mantova	20,000	.....	.....	2,000 Pf	.....
ILSEA, Como	2,700	300	.....	500 Cat	.....
IPLOM, Genoa	10,000	.....	.....	2,000 Pf	.....
Industria Raffinaria Oli Minerali (IROM), Porta Marghera (Venice)	[4]36,000	.....	.....	7,600 T 2,000 Pf	7,000 V, 1,600 Poly, 300 L, 450 A, 6,500 CH
Italia Raffineria Olii Minerali SPA, Cremona	29,000	.....	.....	3,500 T	400 Poly
Lombardia Petroli, Milan	5,200	.....	.....	650 T	.....
Mobil Oil Italiana, Naples	[5]113,700	.....	15,000 TCC	7,500 T 11,000 CR	2,900 V, 11,000 CH, 1,000 Poly, 400 L, 500 A
Petroli d'Itali Fiorenzoula d'Arda	5,000	2,000	.....	720 T	.....
Purfina Italiana, SPA:					
Genoa	11,000	.....	1,800 TCC	1,500 CR	1,100 A
Milan	8,000	.....	.....	.....	3,000 V, 500 L, 1,000 A
Rome	[6]11,000	.....	1,800 TCC	720 CR	1,250 A, 380 L
Raffinaria NILO Spa, Milan	10,000	.....	.....	.....	.....
Raffineria Oli Lubricanti (ROL), Viguzzolo	1,400	.....	.....	.....	380 L
Raffineria Siciliana Oli Minerali, (RASIOM), Augusta	100,000	10,000 Vis	.....	8,000 Pwr 6,500 T	10,000 V, 5,000 A, 8,000 Hyd, 800 Poly
Raffineria Volpato, Milan	2,100	.....	.....	.....	.....
San Quirico, Genoa	4,500	.....	.....	.....	.....
S.A.R.O.M., Ravenna	[7]60,000	.....	.....	5,500 T 4,000 HF	14,000 Un
S.I.R.O.M., Milan	1,500	.....	.....	.....	.....
Sta. per Azioni Raffineria Padana Oli Minerali (SARPOM), Novara	22,000	.....	5,000 FCC	4,000 T	11,000 V, 430 Poly
Sta. per l'Industria del Petroleo (INPET), La Spezia	40,000	.....	.....	3,000 T	.....
Sta. Petrolifera Intaliana, Fornovo Taro	3,000	.....	.....	1,500 CR	.....
Stanic Industria Petrolifera:					
Bari	49,000	.....	.....	7,300 Pwr	7,220 Hyd, 1,800 A
Leghorn (Livorno)	47,000	.....	.....	4,000 T 8,900 Fhy	7,960 Hyd, 2,100 L, 6,000 A
S.T.O.I., Florence	15,000	.....	.....	7,300 Pwr	7,220 Hyd
Total	818,600	19,300	46,200	130,490	

(1) 60,000-bbl.-daily refinery planned as part of petrochem complex. (2) 20,000-bbl. crude unit, plus 3,000-bbl. Platformer planned. (3) Adding 35,000-bbl. crude capacity. (4) Adding 4,000-bbl. Platformer. (5) Adding 1,800-bbl. vacuum unit plus 200-bbl. lube plant. (6) To be replaced by new 30,000-bbl. refinery. (7) Adding 10,000-bbl. Sinclair-Baker cat reformer.

NETHERLANDS

ONE OF THE BEST gas finds ever made in Europe has been confirmed in the Netherlands by the Ministry of Economic Affairs, which indicates reserves of about 2 trillion cubic feet in the Slochteren and Delfzjil areas in the northern part of the country.

The finds were made by NAM, the jointly owned operating company of Royal Dutch-Shell and Jersey Standard. Most progress is being made in developing crude production, which is now more than 37,000 bbl. daily. Locations for three wells off South Holland

have been picked for an offshore program scheduled to start in 1961.

Esso Nederland's new $50-million 100,000-bbl. refinery near Rotterdam was placed on stream this year, and Shell continues to add to its petrochemical facilities in the vicinity of its Pernis refinery. Crude deliveries for the new Rotterdam-Ruhr pipeline are made at a new tanker terminal in the Rotterdam area.

NETHERLANDS PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells		Production in bbl.		Gravity °API
		Flowing	Pumping	Daily avg. 1st 6 mos.	Cumulative	
Alblasserdam, 1957	4,800	.....	.....	43	20,659	25.2
Andel, 1953	3,100-4,800	.....	.....	.....	5,948	12.7-31.7
Berkel, 1954	3,100-3,700	.....	3	68	147,158	32.1
Delft, 1954	3,100-3,800	1	2	23	104,573	31.9-32.5
De Lier, 1955	5,200	1	20	1,772	1,829,493	34.5
Ijsselmonde, 1956	3,100	22	2	6,678	3,677,438	19.8
Lekkerkeek, 1960	.....	.....	1	12	2,195	19.7
Moerkapelle, 1957	2,400-4,400	.....	4	80	73,206	14.1-16.7
Meyendel, 1958	4,200	1	.....	28	31,111	18.2
Pijnacker, 1955	5,800	3	3	945	1,888,719	36.3
Ridderkerk, 1957	3,100-5,000	4	.....	355	228,603	26.6
Rijswijk, 1953	2,500-5,100	.....	6	633	2,294,852	23.5-32.3
Schoonebeek, 1943	2,500	.....	294	18,058	77,320,572	25.0
Wassenaar, 1956	4,200	13	1	4,570	3,609,108	18.4
Werkendam, 1958	6,500	.....	1	28	22,407	33.0
Zoetermeer, 1957	3,200	.....	7	1,063	764,691	16.5
Total		45	344	34,356	92,020,733	

*Includes artificial lift.

NETHERLANDS REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking		Reforming	Other processing
		Thermal	Catalytic		
Caltex Pet. Maatschappij (Nederland), N.V., Pernis	59,000	9,000	.....	7,500 T 7,500 Pf	4,500 Un, 950 Poly,
Esso Nederland, Rotterdam	100,000	.....	.....	16,500 Pwr	16,500 Hyd
N.V. de Bataafsche Petroleum Mij, Pernis	[1]300,000	20,000	77,000 FCC	10,000 T 12,700 Pf	24,200 H
Total	459,000	29,000	77,000	54,200	

(1) Plan to add 6,700-bbl. Platformer and 15,000-bbl. hydrodesulfurization unit.

SPAIN AND PORTUGAL

MUCH of northern Spain is now parceled out in concessions under a new oil law passed last year. Companies, or groups, holding rights include CAMPSA, CIEPSA, Phillips Oil, Esso Iberia, Texaco Spain y California Oil Co. of Spain, Spanish Gulf Oil, Cia. Petrolifera Iberica, and Richfield Sahara Petroleum. Tidewater Oil holds two blocks in the south.

Ohio Oil Co. in association with Cia. Iberica de Petroleos and leading Spanish banking groups have filed a proposal for a 25,000-bbl. refinery on the northern coast of Spain. The move, if approved, will give Ohio Oil an outlet for some of its Libyan crude.

Both Jersey Standard and Royal Dutch-Shell proposed petrochemical projects, but these have been turned down by the Spanish Government for fear of overproduction and a lack of foreign markets.

SPAIN REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking		Reforming	Other processing
		Thermal	Catalytic		
Cia. Espanola de Petroleos, S.A., Santa Cruz de Tenerife, Canary Islands	[1]60,000	.....	.....	5,000 Pf	2,700 V, 500 L, 2,000 A
Refineria de Petroleos de Escombreras, S.A., Escombreras	[2]86,000	.....	.....	9,000 T 11,000 Pf	2,500 V, 350 Poly, 550 L
Total	146,000	.....	.....	25,000	

(1) Plan additional 50,000-bbl. crude unit plus 6,000-bbl. vacuum unit, 15,000-bbl. Platformer, 15,000-bbl. Unifiner, and 2,000-bbl. asphalt capacity. (2) Plan additional 35,000-bbl. crude unit plus 4,500-bbl. vacuum unit.

PORTUGAL REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking		Reforming	Other processing
		Thermal	Catalytic		
Salor, S.A., Lisbon, Cabo Ruivo	22,900	.....	10,600 TCC	.....	1,400 Poly, 190 L
Total	22,900	.....	10,600	.....	

WORLD WIDE OIL

RUSSIA AND SATELLITES

RUSSIA this year established itself as the world's second-leading crude-producing country, behind the U. S., when output passed the 3-million-barrel-daily mark during the third quarter.

Western experts see no reason to doubt Russian claims that this expansion will continue, and it is a foregone conclusion that the Soviets will be producing at least 4.8 million barrels daily by 1965.

The big question is what influence this production, in the form of surplus available for export to foreign markets, will have on the free-world oil trade. Of the 507,000 bbl. daily in crude and products shipped to communist and free-world countries last year, more than half, about 292,000 bbl. daily went to free-world countries, especially western Europe.

The Russians indicate they may be shipping between 525,000 and 765,000 bbl. daily by 1965. A prevalent view is that while some of this oil will be sold for political purposes, most will be shipped abroad to earn foreign exchange to buy products Russia needs. The chief hope of the free-world industry is that fast-rising demand in foreign areas will enable markets to absorb more Russian oil without too much disruption.

One of Russia's biggest problems is transportation facilities. Laying of both oil and gas pipelines is going forward at a rapid rate, despite a shortage of large-diameter pipe. One of the most important systems is the Comecon line which will supply eastern Europe with crude from Second Baku, east of the Volga River. A branch of this system will run northward to the Baltic Sea, which will give Russia a direct outlet to western markets from its chief producing area for the first time.

Russia is energetically exploring a vast region east of the Caspian that is already nicknamed "Third Baku." Important oil and gas discoveries have been made across a 1,000-mile stretch of desert area, and some Soviet geologists believe the area may have reserves comparable to Saudi Arabia and Kuwait.

A new gas field in this region, at Gazli, Uzbekistan, is said to be the biggest in Russia, and possibly the world, and the government plans a 1,400-mile twin 40-in. gas system to industrial centers in the Urals.

American oil men got a peek at the postwar Russian industry for the first time this year when exchange visits were made between delegations of American and Russian oil experts. The consensus of the Americans was that while the Soviets may lag technologically in some respects, the country's oil know-how is adequate for its needs.

Eastern Europe. The new 2,800-mile Comecon pipeline from Second Baku is expected to be delivering about 300,000 bbl. daily to Czechoslovakia, Hungary, Poland, and East Germany by 1965.

About two-thirds of the system is being laid in Russia itself. A single, big-inch line will extend westward from the Kuibyshev area to Mozry, where it will split into two branches. The northern branch will supply refineries in Poland and East Germany. The southern branch will deliver crude to Czechoslovakia and Hungary.

Each satellite is laying the section of line within its own borders, and work is in progress in all four terminal countries, either on the line itself, on refining facilities, or on both.

Romanian output continues at the 230,000-bbl.-daily level, and the country's relative importance as an oil producer is declining in relation to Russia. The country is an important equipment manufacturer, and its gear is in service in India and other free-world countries.

Red China. Communist China expected to produce about 104,000 bbl. daily this year, including some shale oil. It is developing a number of fields, mostly in northwest China. But the best oil areas are remote from markets and expensive to develop.

In order to supplement its crude output, the government this year decreed a crash program of synthetic-oil development. This is to be based on small and medium-sized shale-oil plants that can be built in a short period of time by local labor. These will be supplied by shale and coal deposits scattered widely throughout the country.

SWITZERLAND

A SWISS COMPANY has started preliminary construction on a refinery at Aigle. A 40,000-bbl.-daily plant was initially discussed, but it has not been disclosed whether this level will be reached in the first stage of construction.

The Italian state company, ENI, has relinquished one-third interest in the refining company, Raffineries du Rhone. But it retains the right to use one-third of the processing capacity and to transport all crude supplies via a 250-mile pipeline system that originates in Genoa.

British Petroleum is carrying out a two-well exploration program in the Canton of Fribourg, under an agreement with Soc. d'Interets Miniers S.A.

SCANDINAVIA

TWO MORE plants are planned in a flurry of refinery construction in Scandinavia. Royal Dutch-Shell will build a 40,000-bbl. refinery in either Denmark or Norway, while Gulf Oil will build a 30,000-bbl. plant in either Denmark or Sweden.

These facilities will be a substantial addition to

facilities already built, or under construction. Tidewater is building a 20,000-bbl. plant at Kalundborg, Denmark, and Jersey a 40,000-bbl. plant south of Oslo.

Sweden will start its first petrochemical production in 2 years when Esso opens a 5,000 to 6,000-bbl. unit to produce ethylene, propylene, and butadiene. It will supply feed stocks to petrochemical projects planned jointly by Union Carbide and a local company, Fosfatbolaget, and by another local company, Mo Och Domsjo.

British Petroleum put its brand name on the Finnish market this year when it bought half interest in the country's leading fuel-oil supplier, and renamed it BP/Petko.

FINLAND REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Neste Oy Corp., Naantali	(1)25,000	.....	*12,000 TCC	3,400 Cat	13,000 V, 500 Poly, 5,000 A
Total	25,000	.....	12,000	3,400	

*9,000 bbl. fresh feed. (1) Plan 20,000-bbl. additional crude capacity plus 3,400-bbl. cat reformer and 6,000-bbl. hydrogenation unit.

SWEDEN REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
A. B. Nynas-Petroleum:					
Nynasham	20,000	.....	.....	6,800 Pf 2,000 T	4,500 V
Malmo	1,900	.....	.....	.....	1,500 V
Gothenburg	3,000	.....	.....	.....	2,400 V
Kopportranz Oljeaktiebolag Sharvik	36,000	.....	.....	5,000 CR 4,000 T	7,000 CH
Total	60,900	.....	.....	17,800	

DENMARK REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
A/S Dansk Mineraloliefabrik—Copenhagen	.....	.....	.....	.....	60 L
A/S Kalundberg Olienaffinaderi—Kalundberg	.....	(1)	.....	.....	550 A

(1) 20,000-bbl. refinery due on stream in 1961.

NORWAY REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
A/S Esso-Raffineriet, Norge—Slagenslagen a Naess	(1)	.....	.....	.....	.....
Norske Esso A/S—Valloy Pr. Tonsberg	2,200	.....	.....	.....	1,500 V, 500 L, 500 A
Total	2,200	.....	.....	.....	

(1) 42,000-bbl. refinery due on stream early 1961.

UNITED KINGDOM

CONSUMPTION close to 1 million barrels daily near the end of the year made the United Kingdom a key country in world-wide marketing both in terms of volume and rate of increase.

The hottest competitive battle is in the gasoline market, where consumption grew substantially over the 168,000 bbl. daily used last year. Major marketers this summer reduced the price on many grades by the equivalent of about 1 cent per gallon in the wake of price cutting by isolated name-brand retailers.

Competition is originating with companies abroad with new supplies of products seeking to crack the British market. Commercial buyers are shopping overseas for gasoline bargains, and attempts are being made to wean station owners away from major companies. One newcomer entering the market is Total Oil Products, marketing arm of CFP, which owns half of Hassi Messaoud oil field in the French Sahara.

Milford Haven, a natural harbor in Wales capable of handling 100,000-ton tankers, is becoming a major oil port. British Petroleum's terminal and pipeline to Llandarcy refinery has opened, and Esso Petroleum's new 100,000-bbl. refinery at Milford Haven is in the early stages of operation.

British Petroleum produces about 1,650 bbl. daily from a number of small fields, most of them in the Midlands. Development drilling is in progress in Bothamsall, in Nottinghamshire, and Gainsborough and Corringham, in Lincolnshire. Evaluation drilling is in progress at Kimmeridge field, Dorset, the location of the first significant show of oil ever found in southern England.

WORLD WIDE OIL

UNITED KINGDOM PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells—Flowing	No. of wells—Pumping	Production in bbl.—Daily avg. 1st 6 mos.	Production in bbl.—Cumulative	Gravity °API
Bothamsall, 1958	3,100-3,300	2	11	440	128,000	40.4
Caunton, 1943	2,000-2,200	1	8	16	225,000	27.8
Corringham, 1958	4,200-4,700	....	2	44	30,000	39.1
Duke's Wood, 1941	1,800-2,500	2	94	361	3,889,000	33.6
Eakring, 1939	1,800-2,500	12	8	70	2,018,000	33.6
Egmanton, 1955	3,100-3,400	....	34	564	930,000	39.1
Formby, 1939	85-130	....	8	2	73,000	34.1
Gainsborough, 1959	3,400-4,400	....	2	48	19,000	39.3
Kelham Hills, 1941	2,000-2,500	5	30	151	1,899,000	27.8
Kimmeridge, 1959	1,800	1	....	.....	19,000	44.2
Langar,* 1958	.....	....	....	.....	600	.....
Plungar, 1953	2,700-3,000	....	9	68	.....	.....
Total		23	206	1,764	9,230,600	

*Abandoned.

UNITED KINGDOM REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking—Thermal	Cracking—Catalytic	Reforming	Other processing
England					
Berry Wiggins & Co., Ltd.:					
Kingsnorth on Medway, Kent	[1]1,000	.....	.....	.....	2,000 V, 120 L, 1,500 A
Weaste	[2]1,500	.....	.....	.....	1,660 V, 1,600 A
BP Refinery (Kent), Ltd., Isle of Grain	200,000	.....	.....	[3]12,000 T 16,000 Pf	34,000 V, 2,500 Alky, 3,000 L, 20,000 CH
Esso Petroleum Co., Ltd., Fawley	244,400	.....	49,000 FCC	21,000 Pwr 6,000 T 15,000 Fhy	4,240 L, 2,270 A, 73,100 V, 29,500 Hyd, 4,000 Poly
Lobitos Oilfields, Ltd., Ellesmere Port	[4]4,200	800	.....	800 Pf	1,100 V, 650 L, 150 A
Manchester Oil Refg., Ltd., Manchester	3,500	.....	.....	.....	3,000 V, 3,000 L
Mobil Oil Co., Ltd., Coryton	42,000	.....	10,500 TCC	6,000 CR	21,000 V, 3,300 L
Shell Refg. & Marketing Co., Ltd.:					
Heysham	36,000	6,000 Vis	.....	4,000 T	.....
Androssan	3,200	.....	.....	.....	.....
Shell Haven	160,000	.....	.....	13,000 T 6,700 Pf	16,000 CH
Stanlow	105,000	.....	35,000 FCC	13,000 T 10,000 Pf	.....
Total	800,800	6,800	94,500	123,500	
Scotland					
Grangemouth Petroleum Ref., Grangemouth	75,000	.....	12,500 FCC	.....	24,000 V, 500 CH, 2,200 Poly
Scottish Oils, Ltd., Pumperston	[5]3,500	1,500	.....	.....	15 C[6]
Total	78,500	1,500	12,500	.....	
Wales					
BP Refinery (Llandarcy), Ltd., Llandarcy	70,000	.....	12,500 FCC	6,000 Pf	24,000 V, 500 A, 2,000 L, 3,500 CH
Esso Petroleum Co., Ltd., Milford Haven	[7]	.....	.....	.....	.....
Total	70,000	.....	12,500	6,000	
Total United Kingdom	949,300	8,300	119,500	129,500	

(1) Plan new 1,320-bbl. crude unit, 4,000-bbl. vacuum unit, and 2,500-bbl. asphalt unit. (2) Plan new 500-bbl. crude unit. (3) 23,000-bbl. cat reformer under construction. (4) Adding 5,000-bbl. crude unit, 2,500-bbl. vacuum unit, and 300-bbl. asphalt unit. (5) Feed stock includes shale oil. (6) Tons daily. (7) 100,000-bbl. refinery under construction, to include 16,500-bbl. Powerformer and 16,500-bbl. Hydrofiner.

IRELAND REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking—Thermal	Cracking—Catalytic	Reforming	Other processing
Irish Refining Co., Ltd., Whitegate	40,000	.....	.....	9,000 Pwr	5,400 Hyd
Total	40,000	.....	.....	9,000	

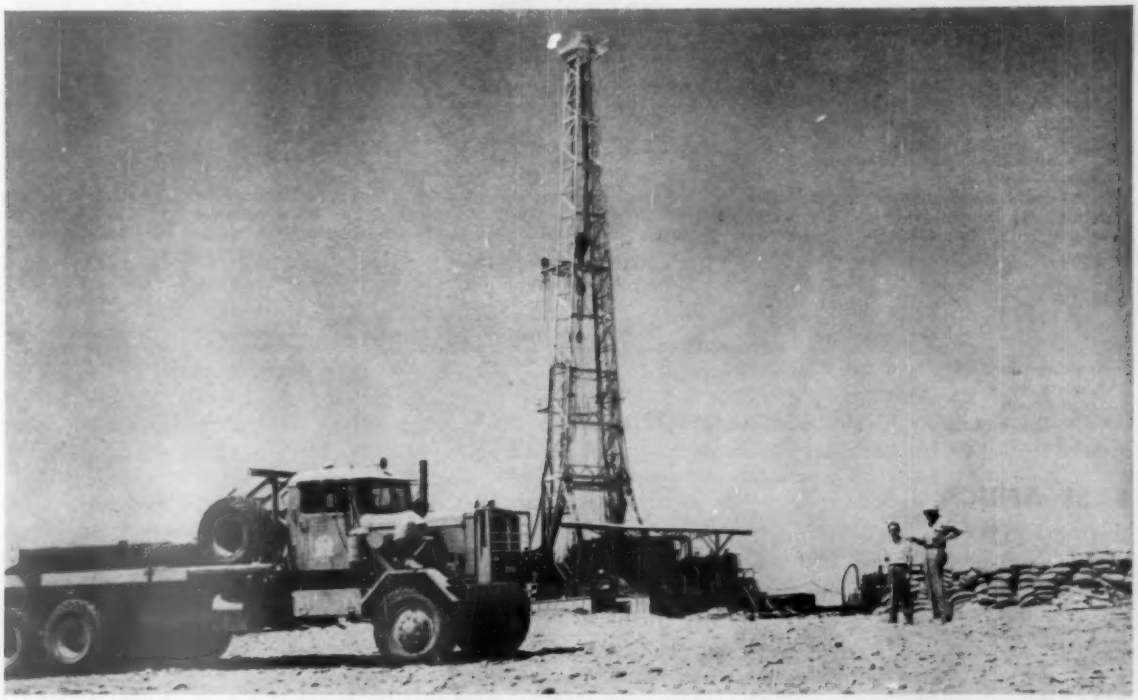
YUGOSLAVIA

CRUDE PRODUCTION in Yugoslavia has nearly trebled since the start of the year as the result of the opening of a new 11-mile pipeline from the Struzec producing area in Croatia. This area is now the best in the country and accounted for most of the 33,000 bbl. daily being produced toward the end of the year.

YUGOSLAVIA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Rafinerijanafte Boris Kidric, Rijeka	8,600	2,600	2,600	.....	800 L, 1,400 A
Rafinerijanafte Bosanski Brod, Bosanski Brod	10,000				
Rafinerijanafte Sisak, Sisak	6,000				

AFRICA



OASIS OIL CO. OF LIBYA discovered oil in its first exploratory well in Libya, the 1 Bahi. Men in photo are P. L. Beverly, personnel supervisor of Oasis, and Monroe Taylor, tool pusher for International Drilling Co.

ALGERIA

THE FRENCH SAHARA, which 5 years ago had no oil at all, is rapidly becoming a major export area with two major pipeline systems delivering steadily increasing crude supplies to Mediterranean ports.

The second of the systems, a 460-mile 24-in. line from the Edjele area in Southeast Sahara to Gabes, Tunisia, was inaugurated in fall, but filling operations got started months earlier. The line is expected to move from 170,000 to 180,000 bbl. daily in 1961 from CREPS' fields, in which Royal Dutch-Shell has 35% interest.

Hassi Messaoud oil field, whose 410-mile 24-in. outlet to Bougie, Algeria, opened last year, produced on a steadily rising curve this year and by next year will average 170,000 to 180,000 bbl. daily. Both owners, CFP and SN Repal, are actively seeking outlets both in France and foreign areas.

A 75-mile 10-in. tie into the Hassi Messaoud pipeline will be built next year from El Gassi-El Agreb field. Four wells completed so far will sustain an initial production of 10,000 bbl. daily. The field is being developed by SNPA in partnership with Coparex, Eurafrep, and Francarep.

The French Council of Ministers has approved a proposal for a 340-mile pipeline from Ohanet oil field to the Hassi Messaoud system. Ohanet is within 75 miles of the Edjele pipeline. But crude could flow to Hassi Messaoud with gravity flow, while a pumping station would be required to send it to the closer system. The line may be routed through El-Agreb-El Gassi field, and incorporated with a pipeline planned from there.

Ohanet is the first Algerian discovery with American participation. Mobil International has 25% inter-

est in partnership with several French petroleum firms.

A 24-in. gas pipeline is under construction from Hassi R'Mel gas field to Bone, Algeria. A preliminary agreement has been reached with Conch International, owned jointly by Shell, Continental Oil, and Union Stockyards, for a gas-liquefaction plant on the North African coast. If the plan materializes, the gas will be exported via special tankers.

ALGERIA (AND SAHARA) PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells		Production in bbl.		Gravity °API
		Flowing	Pumping	Daily avg. 1st 6 mos.	Cumulative	
Eladeb Larache, 1958	2,700	(5)	....	.....	.....	....
El Agreb, 1959	11,600	(6)	....	.....	.....	....
El Gassi, 1959	11,600	(7)	....	.....	.....	....
Edjele, 1956	1,600-2,700	109	....	[1]1,186	215,805	35
Hassi Messaoud, 1956	11,000	[2]52	....	117,457	34,972,370	44
Hassi R'mel, 1956	6,900-7,400	(3)	....	.....	.....	....
Ohanet, 1960	7,740	(8)	....	.....	.....	....
Oued Guerterini, 1949	1,100-1,600	....	15	83	2,497,000	39
Tiguentourine, 1956	2,800	(4)	....	.....	.....	42
Zarzaitine, 1957	4,500	70	....	(*)	(*)	42
Total Algeria (and Sahara)		231	15	118,726	37,685,175	

(1) Field went on limited production in June. (2) Twenty wells shut in. (3) Gas-condensate field. Shut in, awaiting pipeline. (4) Shut in. (5) Field discovery. (6) Field discovery. (7) Four-well field due on production at 10,000-bbl. rate next year. (8) Two-well field. *Included in Edjele production. Two fields produced at 100,000-bbl. rate late this year.

ALGERIA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking		Reforming	Other processing
		Thermal	Catalytic		
Jersey Standard-CFP-Royal Dutch-Shell, etc., Algiers	(1)	.....	.....	.....	.....

(1) Seven-company combine plans 44,000-bbl. refinery.

EAST AFRICA

WILDCATTING continues at a reduced rate in East Africa. Sinclair Somal and ENI are drilling on their acreage blocks in Somalia, but Stanvac has given up an 11,000-sq.-mile concession in British Somaliland after a discouraging 6-year program. In Kenya, BP-Shell Petroleum Development Co. has started a series of medium-depth stratigraphic wells. Shell and BP plan to open a $45 million refinery in Kenya by 1964.

EGYPT

EGYPT put up a 116,000-sq.-mile area in the Western Desert for concession bidding this year, but oil companies are believed to be shying away from terms demanded by Cairo. These reportedly are a 75-25 profit split in favor of the government, and effective government control over operating companies. The area was given up 2 years ago by a group of four American companies, Continental Oil, Ohio Oil, Cities Service, and Richfield Oil, which spent $35 million in an unsuccessful 4½-year program. Major discoveries in Libya, to the west, however, renewed interest in the territory.

A new government-operated field, Ras Bakr, went on commercial production early this year on the Egyptian mainland, and by midyear was making 5,000 bbl. daily. Most crude production continues to be handled by Anglo-Egyptian Oilfields, Mobil, and Cie. Orientale des Petroles, owned 51% by Egypt, and 49% by International Egyptian, whose main stockholders are Petrofina and ENI.

Czechoslovakia will carry out two refinery-expansion programs planned under a United Arab Republic 5-year plan. The projects include the addition of 20,000-bbl. capacity at Alexandria, and construction of a 20,000-bbl. plant at Suez.

Record tanker traffic is moving through the Suez Canal. Egypt's Suez Canal Authority this year sought financing abroad for an improvement program.

EGYPT PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells		Production in bbl.		Gravity °API
		Flowing	Pumping	Daily avg. 1st 6 mos.	Cumulative	
Abu Durba and other abandoned fields	....	.....	.....	.....	79,880	....
Abu Rudeis (inc. Sidri), 1956	8,500	12	....	6,569	7,175,697	22
Asl, 1948	2,870-3,870	5	3	2,949	29,078,085	22
Belayim, 1955	5,100-8,750	54	....	27,718	29,959,665	22-23
Feiran, 1949	6,800	4	....	284	754,670	26

EGYPT PRODUCTION (Continued)

Name of field—Discovery date—	Depth (ft.)	No. of wells—Flowing	No. of wells—Pumping	Production in bbl.—Daily avg. 1st 6 mos.	Production in bbl.—Cumulative	Gravity °API
Gemsa, 1908	400-2,000	....	....	.....	1,457,410	41
Hurghada, 1913	700-2,500	....	23	617	39,796,342	22-30
K'reim, 1958	2,300	....	....	.....	.....	17-18
Ras Bakr, 1958	2,800	15	....	2,883	524,747	22-23
Ras Gharib, 1938	1,200-2,500	8	117	16,729	167,926,689	26
Ras Matarma, 1948	1,940-3,200	....	3	286	674,940	17-18
Sudr, 1946	2,700-3,000	4	....	3,179	32,664,145	23-24
Total		102	146	61,214	310,092,270	

EGYPT REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking—Thermal	Cracking—Catalytic	Reforming	Other processing
Anglo-Egyptian Oil Fields, Ltd., Suez	60,000	.....	.....	3,000 T	.....
Raffinerie de Petrol du Govt., Suez	27,000	2,700	.....	2,700 T	1,300 V, 500 Poly, 650 A
Societe Egyptienne pour la Raffinage et le Commerce du Petrole S. G. E. ("SERCOP"), Alexandria	[1]6,200	.....	.....	1,200 CR	.....
Total	93,200	2,700	.....	6,900	

(1) Plan additional 22,000-bbl. crude capacity.

LIBYA

THE FIRST major new find in 1960 was brought in by Oasis Oil late in the year when it tested its A2 wildcat in Block 59 at 4,440 bbl. daily from 6,600 ft. The well is 15 miles north of the company's B1 discovery made in the same block earlier in the year, and 35 miles south-southeast of Esso's prolific Zelten field.

If the promise of the new field is sustained, Oasis Oil, owned jointly by Continental Oil, Ohio Oil, and Amerada Petroleum, may be able to move its crude to the Mediterranean via a 100-mile 30-in. pipeline under construction from Zelten to Marsa el Brega. Esso will be able to move 100,000 bbl. daily through the line.

Oasis plans a big-inch pipeline of its own from Dahra, an earlier discovery area in Block 32. The line will be at least 30 in., with some sections possibly as large as 42 in. A spur to the line is planned from the Esso-Libyan American Mabruk field on an adjoining block to the west.

Oasis is the busiest operator, with 12 of the 35 rigs operating in the country. Other companies actively drilling besides Oasis and Esso are Shell, Mobil, British Petroleum, Amoseas, Gulf Oil, CPTL, and Deutsch Erdoel.

Atlantic Refining Co. joined the Libyan oil play by winning four offshore tracts in the Gulf of Sirte covering 10,500 sq. miles. Other newcomers may enter the country soon under a new round of awards that may be made on acreage turned back by concessionaires under the terms of the Libyan oil law. The first relinquishments took place in November.

LIBYA PRODUCTION[1]

Name of field—Discovery date—	Depth (ft.)	No. of wells—Flowing	No. of wells—Pumping	Production in bbl.—Daily avg. 1st 6 mos.	Production in bbl.—Cumulative	Gravity °API
Bahi, 1959	6,100	2	....	.....	.....	40
Bir Tlacsin, 1959	8,976	2	....	.....	.....	44
Beda, 1959	5,107	5	....	.....	.....	36
Block 59, 1960	6,600	3	....	.....	.....	35
Dahra, 1959	4,940	13	....	.....	.....	43
El Amal, 1959	11,290	2	....	.....	.....	35
Em-Gayet, 1959	4,100	1	....	.....	.....	35
Mabruk, 1959	5,700	3	....	.....	.....	40
Zahalin, 1959	9,228	2	....	.....	.....	39
Zelten, 1959	5,670-7,657	5	....	.....	.....	37
Total		38	....	.....	.....	

(1) All fields shut in awaiting pipeline outlets.

MOROCCO

CONSTRUCTION has started on a $14-million 20,000-bbl. refinery being built jointly by ENI and local interests at Mohammadia, 20 miles north of Casablanca. The plant is scheduled to go on stream in 1962. A French company, Soc. Cherifienne des Petroles, handles the country's small crude production.

WORLD WIDE OIL

MOROCCO PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Ain Hamra, 1918	400	.....	.....	.....	93,772	36.5
Bled ed Defaa, 1952	.....	.....	.....	.....	68,467	.....
Bou-Draa, 1936	2,800	.....	.....	.....	276,482	39.2
Haricha, 1957	2,700	20	1	1,445	.....	.....
Lower Bled Eddoum, 1952	4,300	7	.....	50	.....	.....
Lower Bled Khatara, 1954	5,200	3	.....	10	.....	.....
Lower Sidi Fili, 1950	4,500	12	.....	50	.....	.....
Lower Zrar, 1955	5,600	1	.....	30	.....	.....
Mers-el-Kharez, 1951	4,300	6	.....	35	.....	.....
Oued Beth Baton, 1947	3,300	9	.....	21	.....	.....
Oued Mellah, 1949	1,900	11	.....	50	.....	.....
Tisserand, 1948	.....	.....	.....	.....	10,120	.....
Upper Bled Eddoum, 1952	3,950	.....	8	160	.....	.....
Upper Bled Khatara, 1953	4,600	.....	9	180	.....	.....
Upper Sidi Fili, 1952	3,950	.....	4	15	.....	.....
Upper Zrar, 1955	4,900	.....	1	4	.....	.....
Total		69	23	2,050	7,546,417	

*Estimated.

MOROCCO REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking Thermal	Cracking Catalytic	Reforming	Other processing
Ste. Cherifienne des Petroles, Petijean	2,100	.....	1,800 TCC	.....	.....
Total	2,100	.....	1,800	.....	

NIGERIA AND WEST AFRICA

NIGERIAN crude production may reach 200,000 bbl. daily within 10 years if progress continues at the present rate. The optimistic view is taken by Shell-BP (Nigeria) which has licenses in the Niger Delta. A new 12-in. crude pipeline to Bonny was built this year, and output by the end of December was expected to reach 30,000 bbl. daily.

Mobil Oil and Tennessee Gas Transmission hold exploration rights in western Nigeria, and bids on offshore areas have been made by Gulf Oil and Caltex.

Gabon. Production from small fields in the Pointe Clairette area operated by the French SPAEF has leveled off at about 16,000 bbl. daily. Exploration work continues in the joint SPAEF-Mobil concession area where a discovery was made at Rembo Kotto last year.

Exploration also continues in other parts of areas formerly in French West or French Equatorial Africa. One rig is running in Senegal, and work is continuing in Middle Congo.

Angola. A new small-diameter-pipeline outlet from new field discoveries in Angola was built this year. The finds were made by Petrofina at Galinda and Bon Jesus. Galinda is the best-looking find, testing 600 bbl. daily through a 1/16-in. choke.

NIGERIA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Afam, 1957	900-9,400	5	.....	1,844	2,072,474	26-55
Akata, 1953	5,500-7,000	.....	.....	(*)	.....	48.0
Bomu, 1958	7,100-7,500	6	.....	9,636	2,264,070	32-38
Bonny, 1959	7,022-7,048	1	.....	10	2,077	30.5
Ebubu, 1958	8,200-8,500	4	.....	31	761,954	26-30
Imo River, 1959	5,900-6,000	.....	.....	(*)	84	23
Oloibiri, 1956	8,000-9,800	9	.....	4,727	3,568,690	20-29
Soku, 1958	10,600-10,650	.....	.....	(*)	4,860	33.8
Total Nigeria		25	.....	16,248	8,674,209	

*Shut in.

WEST AFRICA PRODUCTION
Angola

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Benfica, 1955	8,530	6	.....	750	588,290	28.5
Cacuaco, 1958	8,200	1	1	113	109,723	29.6

WEST AFRICA PRODUCTION (Continued)

Name of field—Discovery date—	Depth (ft.)	No. of wells—Flowing	No. of wells—Pumping	Production in bbl.—Daily avg. 1st 6 mos.	Production in bbl.—Cumulative	Gravity °API
Galinda, 1959	7,054	3	....	183	35,482	30.0
Luanda, 1957	5,580	4	....	214	332,778	30.2
Total Angola		14	1	1,260	1,066,273	
Gabon						
Alewana, 1958	2,900	5	....	255	177,786	....
Animaba, 1957	1,600	5	....	376	204,842	13
Cap Lopez, 1958	5,700	15	....	1,930	1,124,525	31.6
M'Bega, 1957	2,600	21	....	4,846	3,900,722	28
Ozouri, 1956	2,000	9	....	1,910	2,691,160	22
Pointe Clairette, 1956	3,000-4,000	44	....	4,486	4,457,280	33
Tchengue, 1958	3,780	10	....	1,811	823,842	25.5-31
Total Gabon		109	....	15,614	13,380,157	
Moyen Congo						
Pointe Indienne, 1957	4,000	*7	....	.....	.....	36.5
Total Moyen Congo		7	....	.....	.....	
Total West Africa		130	1	16,874	14,446,430	

*Shut in.

WEST AFRICA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking—Thermal	Cracking—Catalytic	Reforming	Other processing
Companhia de Petroleos de Angola, Luanda, Angola	2,200	.....	.....	.....	.....
Total	2,200	.....	.....	.....	

SOUTH AFRICA

BRITISH PETROLEUM and Royal Dutch-Shell plan a 60,000-bbl. refinery at Durban. The plant is scheduled to open in 1963.

In South West Africa, a 90,000-sq.-mile concession has been awarded to Etosha Petroleum Co., a subsidiary of Texas Eastern Transmission.

SOUTH AFRICA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking—Thermal	Cracking—Catalytic	Reforming	Other processing
Standard-Vacuum Refining Co. of South Africa, Ltd., Durban	25,000	.....	13,000 FCC	4,100 Pwr	5,700 Hyd, 425 Poly, 1,500 A
Total	25,000	.....	13,000	4,100	

SPANISH SAHARA

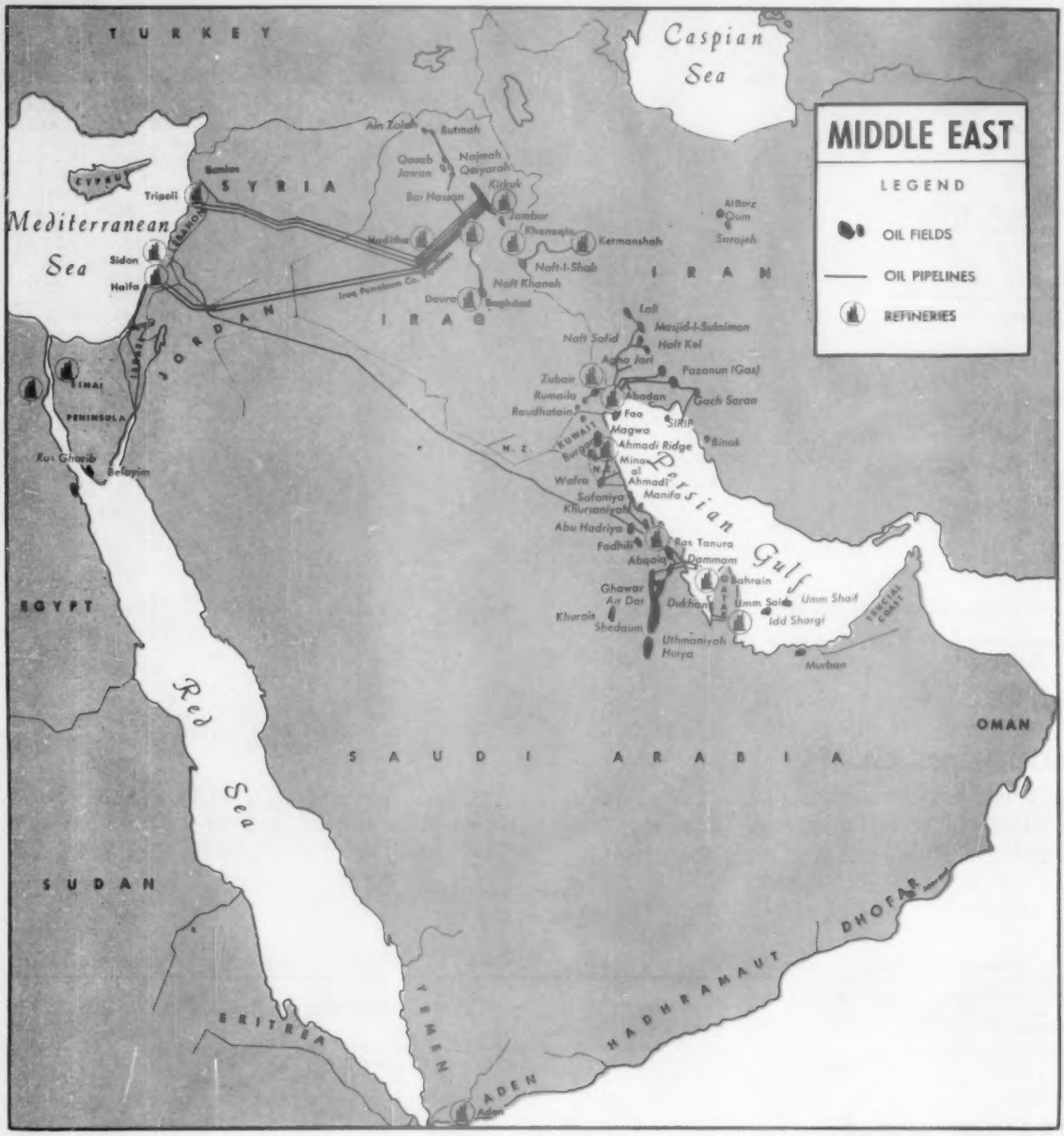
THE WHEELS are just starting to turn in exploration programs that will cost oil companies at least $200 million in the next 6 years. Firms participating in the oil play include Tidewater, Cities Service, Gulf, Richfield, Phillips, Union Oil of California, Atlantic Refining, Sun, Champlin, Pure, Standard of Ohio, and Magellan Investment.

The companies were attracted by a new Spanish oil law which provides for a 50-50 profit split, and by major discoveries to the east in North Africa. Most—but not all—of the concessions are held jointly with local Spanish interests.

TUNISIA

A 24-IN. 468-MILE crude pipeline from the southeastern Saharan oil fields to La Skhira, on the Gulf of Gabes, has made Tunisia an important outlet terminal for Algerian crude.

Italy's state-owned ENI won the competition for rights to build the country's first refinery. The 20,000-bbl. plant will be owned jointly by ENI and the government. Tied in with the refining agreement is a concession over parts of the Tunisian Sahara. As in other ENI agreements, the government has half interest in the operating company, with no obligation to pay its share of the expense until such time as commercial production has been found, and then to receive 75% of the profit split.



MIDDLE EAST

BAHRAIN

BAHRAIN PETROLEUM CO. started its first offshore well in mid-October when drilling got under way off the north end of the island at Fasht al-Jarim shoal, about 15 miles north of Manama. The wildcat is in search of fresh reserves that would supplement supplies from the shaikhdom's one mainland oil field. With existing production stabilized at 45,000 bbl. daily, the chief activity of the Caltex affiliate continues to be the operation of the big refinery, which is supplied largely by a pipeline system from Saudi Arabia.

BAHRAIN PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells		Production in bbl.		Gravity °API
		Flowing	Pumping	Daily avg. 1st 6 mos.	Cumulative	
Bahrain Zone, 1932	2,200	146	....	44,393	234,785,989	33.0
Fourth Pay, 1936	4,500	4	....	670	3,332,660	36.0
Total		150	....	45,063	238,118,649	

BAHRAIN REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Bahrain Petroleum Co., Ltd., Bahrain	*186,500	16,020 27,300 FCC		19,950 T 10,450 Pf	34,020 V, 10,450 Un, 2,050 Poly, 1,990 A
Total	186,500	43,320		30,400	

*All figures on calendar-day basis.

IRAN

THE OPENING of a big, new export terminal on the Persian Gulf topped off a hatful of important developments in Iran this year.

The completion by the consortium operating companies of Kharg Island terminal and a 100-mile 26-28-30-in. overland and submarine pipeline capable of moving 390,000 bbl. daily from Gach Saran field is a major addition to Iran's export capacity. Until now, output from the big field has been limited to 60,000 bbl. daily taken off by a 12-in. pipeline to Abadan. The terminal shortens the tanker haul for ships picking up Iranian crude and it can handle tankers up to 100,000 tons.

Italy's ENI reported a 3,500-bbl.-daily discovery at the head of the Persian Gulf, where it has a joint program with National Iranian Oil Co. that will give it the small side of a 25-75 profit split. SIRIP, the operating company, is testing the find at 11,011 ft., and has started a second well from the same platform. SIRIP also is drilling ahead below 5,200 ft. in a wildcat in the Zagros Mountains.

Indiana Standard is testing oil shows in its first deep test well in the Persian Gulf, and is drilling ahead below 11,800 ft. in its second offshore well. IPAC is the operating company in another agreement that will give Indiana Standard the smaller share of a 25-75 profit split.

Iran-Canada Oil Co., owned jointly by Sapphire Petroleums, Ltd., Toronto, and NIOC, reportedly forfeited two small blocks on the Gulf of Oman for failure to meet terms of the contract.

NIOC had a big exploration year in its own program in northern Iran. It announced that Sarajeh structure, about 100 miles south of Teheran, is one of the world's biggest gas fields, with proven reserves of more than 7 trillion cubic feet. A study is being made for moving some of the gas to Teheran.

A short distance northwest of Sarajeh, NIOC finally tamed a tiger oil field when it completed Alborz 8 as a 20,000-bbl.-daily well from an interval at 10,500 ft. The company has drilled the structure for years, and in 1956 Alborz 5 had a spectacular blowout that lost about 5 million barrels of oil before shutting itself in.

NIOC is already supplying the Teheran area via a products pipeline from Abadan refinery. The system is being extended throughout northern Iran.

IRAN PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Agha Jari, 1937	4,900-10,000	33	....	650,961	1,262,675,219	34.2
Ahwaz, 1958	8,419	1	....	5,442	1,009,139	32.0
Alborz (Qum), 1956	8,500	....	....	(1)	.....	...
Gach Saran, 1928	2,800-10,000	13	....	61,865	196,338,914	32.0
Haft Kel, 1928	1,900-4,900	20	....	166,125	1,201,859,952	37.8
Lali, 1938	4,000-9,000	5	....	12,271	35,764,890	35.2
Masjid-i-Sulaiman, 1908	680-5,300	31	....	63,910	959,434,544	37.8
Naft-i-Shah, 1935	2,100-3,000	4	....	4,908	39,288,236	41.9
Naft-Safid, 1935	3,000-7,000	17	....	44,025	101,769,454	35.2
Sarajeh, 1958	8,000-8,590	....	....	(2)	.....	...
Total		124	....	1,009,507	3,798,140,348	

(1) Iran Oil Co. discovery. Not on production. (2) Three-well Iran Oil Co. field. Shut in.

IRAN REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Iraanse Aardolie Raffinage Maatschappij N.V. (Iranian Oil Refining Co.):					
Abadan	415,000	.....	35,000 FCC	81,000 T	74,000 V, 5,000 A, 10,000 Alky, 450 A
Masij-i-Salaiman	75,000	.....	.....	.....	.....
National Iranian Oil Co., Kermanshah	5,000	.....	.....	.....	.....
Total	495,000	.....	35,000	81,000	

WORLD WIDE OIL

IRAQ

IRAQ assumed a role of leadership among major exporting nations this year when it served as host at Baghdad to the formation meeting of Organization of Petroleum Exporting Countries (OPEC). This group proposed a series of resolutions designed to raise crude prices to levels preceding the August cut, and to present a unified oil policy in the future. Iraq and other members of the conference, Venezuela, Saudi Arabia, Iran, and Kuwait, gave unanimous approval to the resolutions.

Iraq also is negotiating with Iraq Petroleum Co. Ltd., which with the affiliated Basrah Petroleum Co. and Mosul Petroleum Co., handles most of the country's crude production. The government is believed seeking greater oil revenues, more influence in oil operations, a relinquishment of a substantial amount of the IPC group's concession areas, and possibly a financial interest in IPC itself.

IPC turned back its offshore rights in the Persian Gulf 2 years ago, shortly after Premier Kassim came into power. The government has now authorized the ministry of oil to invite bids on the area.

Work is moving ahead on a Basrah Petroleum tanker terminal 24 miles off Fao. When completed, the new offshore pier will enable the company to increase production from southern Iraq fields to 440,000 bbl. daily.

The government is planning two projects of its own. One is a proposed 40,000-bbl. refinery at Basrah that will supply Iraq's southern provinces. The $56-million plant is scheduled for completion within 5 years. It will operate on crude from Zubair and Rumaila fields, supplied by Basrah Petroleum.

The other plan is for a pipeline from relatively small Naft Khanah field, turned over to the government by British Petroleum 2 years ago, to the government-run Baghdad refinery, and a further extension to the IPC pipeline system.

IRAQ PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells—Flowing	No. of wells—Pumping	Production in bbl.—Daily avg. 1st 6 mos.	Production in bbl.—Cumulative	Gravity °API
Ain Zalah, 1939	5,800	4		18,425	55,244,611	31.8
Bai Hassan, 1953	4,800	5		33,387	1,497,785	34.5
Butmah, 1952	5,100	2	2	8,516	12,891,415	31.7
Jambur, 1954	5,700	2		11,033	5,114,511	34.5
Kirkuk, 1927	2,800	44		643,087	1,917,830,043	35.9
Naft Khaneh, 1923	3,000	2		*3,300	*60,115,500	42.0
Rumalia, 1953	10,800	11		172,648	225,377,303	34.9
Zubair, 1949	11,000	25		72,936	248,813,918	35.0
Total		95	2	963,332	2,526,885,086	

*Estimated.

IRAQ REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking—Thermal	Cracking—Catalytic	Reforming	Other processing
Government Oil Refineries Administration:					
Daura	48,000	17,000 Vis 4,000		5,000 Pwr	12,250 V, 5,000 Un, 400 L, 1,000 A
Quaiyarah	12,280				
Khanaqin Alwand	12,500				
Muftieh Depot, Basrah	4,230				
Iraq Petroleum Co., Ltd.:					
K. 3 (Haditha)	6,450				
Kirkuk	2,880				
Total	76,340	21,000		5,000	

(1) Not operating.

ISRAEL

ISRAEL acquired the ability to become a crude or products exporter this year with the opening of a 125-mile 16-in. pipeline link between Elat and Haifa. This made the over-all 250-mile system to Haifa 16 in. all the way, and permits deliveries to the Mediterranean seaboard of up to 100,000 bbl. daily of crude, far more than local requirements.

Since the capacity of Haifa refinery is greater than local demand, the country is now able to compete, on a limited scale, in European markets as either a crude

or products exporter. A new export company has been organized by local groups, and product sales amounting to several million dollars have been tied down.

The country is enjoying modest exploration success. A new, deeper pay has been tapped at Heletz, and a new oil pool has been found 3 miles north of the oil field. Gas also was found 2 miles from Zohar gas field, which will supply a potash plant on the Dead Sea via an 18-mile pipeline, and a power plant on the Mediterranean Coast through a 75-mile line.

ISRAEL PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Heletz, 1955	5,000	.....	24	2,661	2,511,854	31
Negba, 1960	5,200	.....	(*)	.....	.....	.....
Total		.....	24	2,661	2,511,854	

*Field discovery.

ISRAEL REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Paz Oil Co., Ltd., Haifa	87,000	.....	.....	20,000 T	5,000 V, 1,000 A
Total	[1]87,000	.....	.....	20,000	

(1) Currently operating at about 32,000 bbl. daily.

KUWAIT

THE WORLD'S PRIZE exploration plum was awarded to Royal Dutch Shell late this year when Kuwait granted the company offshore rights in the Persian Gulf in return for an $84-million bonus plus 20% participation in a new development company. The Shell offer calls for the traditional 50-50 profit split of profits, which may help stave off further erosion of the general pattern. The offshore area has never been drilled, but large reserves are considered semiproven because of drilling in nearby areas. If the hoped-for production develops, Shell for the first time will have adequate crude supplies of its own in the Middle East.

The tiny shaikhdom continued to pace Middle East crude production as output soared above the 1.7-million-barrel-daily mark during some months.

The country's export capacity was further increased with the opening of Raudhatain oil field with the completion of a 63-mile 30-in. pipeline outlet to Kuwait Oil Co.'s new North Pier. Kuwait Oil, owned jointly by British Petroleum Co. and Gulf Oil Corp., has drilled 26 wells at Raudhatain. In addition, wells at Sabriya and Bahrah are tied into the gathering system. The initial 100,000-bbl. daily capacity of the system can readily be doubled by adding pumping facilities.

KUWAIT PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Burgan, 1938	3,500-4,800	232	.....			30-32
Magwa-Ahmadi, 1952	3,500-4,800	80	.....	1,579,600		.....
Minagish, 1959	9,000-10,000	2	.....	(*)	3,689,201,336	.....
Raudhatain, 1955	7,800-10,000	28	.....	(1)		.....
Sabriya, 1957	7,500-8,200	(2)	.....			.....
Total		342	.....	1,579,600	3,689,201,336	

*Shut in. (1) Went on production in May at rate of 100,000 bbl. daily. (2) Two-well field not yet on production.

KUWAIT REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
American Independent Oil Co., Mena Abdulla	*30,000	.....	.....	.....	.....
Kuwait Oil Co., Ltd., Mina-al-Ahmadi	190,000	.....	.....	4,070 Pf	500 A
Total	220,000	.....	.....	4,070	

*Processing Neutral Zone crude.

NEUTRAL ZONE

THE JAPANESE-BASED Arabian Oil Co. has completed five wells in its Neutral Zone offshore discovery area, which it will place on commercial production in spring.

The latest well, Khafji 5, tests 8,400 bbl. daily from 5,420 ft. The first four wells are in the 6,000-bbl.-daily class. The production, 25 miles offshore, will be stored in five stationary tankers that form part of

a temporary offshore loading station. The company will start moving 28,000 bbl. daily into Japan the first 3 months of the year, with output to increase later.

The two onshore operators increased output to 135,000 bbl. daily late this year. Getty Oil Co., with the concession of Saudi Arabia's undivided one-half interest in the Neutral Zone, takes most of its crude from the Eocene formation. Aminoil, with rights over Kuwait's half interest, takes most of its oil from the Ratawi formation.

NEUTRAL ZONE PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Wafra field:						
Burgan, 1953	3,700	33	....	32,576	77,064,344	24
Eocene, 1954	1,200-2,200	64	40	53,721	36,347,179	17-19
Khafji, 1960	5,500	(1)	....	....	....	26
Ratawi, 1955	7,100	20	....	42,599	31,546,888	25
Total		117	40	128,896	144,958,411	

(1) Five-well offshore field not yet on production.

NEUTRAL ZONE REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Getty Oil Co., Mina Saud	*50,000	.....	.....	.....	.....
Total	50,000	.....	.....	.....	

*Dual-purpose topping or stabilizer plant.

QATAR

SHELL CO. OF QATAR may have tapped a new oil field in the Persian Gulf on its concession over Qatar waters. The company reported with caution that oil was found in the Middle Jurassic in Idd El Shargi 2 wildcat 52 miles east of Qatar Peninsula. Further wells will have to be drilled on the structure, however, before its value can be assessed. After completing the discovery, the mobile platform was moved to Hadet Shibeeb, 26 miles off Doha, where a dry hole was drilled. The platform has now returned to the discovery, where it is drilling Idd El Shargi 3 stepout 1½ miles south of No. 2. Known horizons of the one mainland field, Dukhan, are fully developed and produce about 174,000 bbl. daily.

QATAR PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Dukhan, 1940	6,550	34	....	172,707	420,318,668	41.7
Total		34	....	172,707	420,318,668	

QATAR REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Qatar Petroleum Co., Ltd., Umm Said	600	.....	.....	.....	.....
Total	600	.....	.....	.....	

SAUDI ARABIA

ARABIAN AMERICAN OIL CO. opened Khursaniyah oil field to commercial production late this year with the completion of a 75,000-bbl. gas-oil separator and a 65-mile 30-in. pipeline outlet to Ras Tanura terminal on the Persian Gulf.

The 31°-gravity crude, however, is moving via an earlier 22-in. pipeline from Safaniya field to Ras Tanura that runs directly through the field. Safaniya crude, from a bigger field, still moves as far as Khursaniyah via the 22-in. line. But it is now diverted into the 30-in. parallel section when it reaches the Khursaniyah pump station.

Aramco has completed a third producing well at Abu Hadriya, a 20-year-old oil field 87 miles north-northwest of Dhahran. The field, the second to be discovered in Saudi Arabia, has not been fully explored

until now because of subsequent discoveries at shallower depths. Six wells have been drilled, of which three are producers below 10,000 ft., two are dry holes, and one is an observation well.

Shaikh Abdullah al-Tariki, head of the government's oil agency, played a leading role both in intergovernmental relations between the world's major producing countries. He was a leader in the formation of the Organization of Petroleum Exporting Countries (OPEC) at Baghdad, in which Venezuela, Iran, Iraq, Kuwait, and Saudi Arabia agreed to work jointly toward maintaining oil prices and gain a bigger voice in the operation of the oil industry. He also was a leading figure at the Second Arab Oil Congress at Beirut, where Arab leaders again voiced a desire for a greater influence in world oil operations.

SAUDI ARABIA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Abqaiq, 1941	6,800	59	....	266,755	1,568,352,568	38
Abu Hadriya, 1940	10,115	(1)	....	....	9,579	35
Dammam, 1936	4,850	28	....	35,983	400,844,531	35
Fadhili, 1949	9,850	....	....	....	....	37
Ghawar, 1948	7,125	86	....	727,001	1,852,090,825	35
Khurais, 1957	5,200	(2)	....	13	5,465	33
Khursaniyah, 1956	6,900	(3)	....	138	25,098	31
Manifa, 1957	7,900	(4)	....	....	....	27
Qatif, 1945	7,350	5	....	14,722	106,769,877	35
Safaniya, 1951	5,560	23	....	174,422	93,926,389	27
Total		201	....	1,219,034	4,022,024,332	

(1) Two-well field shut in. (2) Eleven-well field shut in. (3) Five-well field shut in until late 1960. (4) Seven-well offshore field shut in.

SAUDI ARABIA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking Thermal	Cracking Catalytic	Reforming	Other processing
Arabian American Oil Co., Ras Tanura	189,000	....	15,500 FCC	26,600 T	15,000 Un, 1,210 Alky, 1,000 Poly, 900 A
Total	189,000	....	15,500	26,600	

SYRIA, LEBANON, AND JORDAN

LESS Saudi Arabian crude moved through Syria, Lebanon, and Jordan this year en route to the Mediterranean Coast as low tanker rates cut deeply into Trans-Arabian Pipe Line Co. volume. Deliveries from Sidon, Lebanon, of about 234,000 bbl. daily were less than half of Tapline's capacity.

A new 6,400-bbl. refinery, the first in Jordan, has opened with crude supplied via a 26-mile 8-in. spur from Tapline. Phillips Petroleum has abandoned its sixth dry hole in its Jordanian concession. It continues to hold the rights, but has no wells in progress at the present time.

Beirut was the focal point of the oil industry in October when Lebanon served as host to the Second Arab Petroleum Congress, a meeting ground for Arab and other oil leaders and companies. After a week of discussion, the congress approved relatively mild resolutions demanding an improvement in concession terms and disavowing the recent price cuts.

The Syrian branch of United Arab Republic has two possible commercial oil fields in the northeastern part of the country. The eighth well at Karachuk reportedly tests 3,500 bbl. daily through a 2-in. choke. The find, made by American interests 5 years ago, is on acreage subsequently taken over by the government. A subsidiary of a German firm, Deutsche Erdol, is negotiating with the government over development of a field discovery at Suwaidiyah.

SYRIA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Karachuk, 1956	6,000	(1)	....	.....	.....	22
Suwaidyah, 1959	5,350-5,620	(2)	....	.....	.....	....
Total		....	....	.....	.....	

(1) Eight-well field. Shut in for lack of pipeline outlet. (2) Two-well field. Shut in for lack of pipeline outlet.

SYRIA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking Thermal	Cracking Catalytic	Reforming	Other processing
Syrian Government, Homs	20,000	.....	.....	.....	.....
Total	20,000	.....	.....	.....	

WORLD WIDE OIL

JORDAN REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Jordan Oil Refinery Co., Zerqa	6,400				
Total	6,400				

LEBANON REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Iraq Petroleum Co., Ltd., Tripoli	11,550				
Mediterranean Refining Co., Beirut, Sidon	12,500			1,400 Pf	
Total	24,050			1,400	

SOUTHERN ARABIA

COMMERCIAL development is in progress at Umm Shaif offshore oil field in the southern bulge of the Persian Gulf, 20 miles off Das Island. British Petroleum has two-thirds interest in the venture, and CFP one-third, through Abu Dhabi Marine Areas, which holds a concession from the Trucial Coast shaikhdom of Abu Dhabi. Several wells have been completed, and bids have been asked on a 20-mile 18-in. submarine pipeline that will move crude to a tanker terminal at Das. On the mainland, Petroleums Development (Trucial Coast) Ltd. reported several interesting oil shows below 8,400 ft. in Murban 3, a wildcat a few miles from the Persian Gulf and 5 miles from the town of Abu Dhabi. The Iraq Petroleum Co. affiliate has been testing the structure for years. The first well tested 1,500 bbl. daily, but later failed to produce and was abandoned.

Another IPC affiliate, Petroleum Concessions, Ltd., reached a hopeless deadlock in concession talks with two shaikhdoms in eastern Aden Protectorate. The area involved is the Thamud, which lies in the northern Hadramaut Desert. Both the states of Qu'aiti and Kathiri claim the Thamud, and are now looking elsewhere for bidders.

ADEN REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
B.P. Refinery (Aden), Ltd., Aden	120,000			12,000 Pf	3,500 CH
Total	120,000			12,000	

TURKEY

BEST ENCOURAGEMENT since the passage of a new oil law 6 years ago came this year with a discovery by Mobil International in South Ceneral Turkey.

The find, Bulgardag 1, tested 1,200 bbl. daily from about 4,700 ft. after acidizing. The first stepout, about ½ mile south, tested 1,600 bbl. daily of 38°-gravity water-free crude through a ½-in. choke after treatment. The find is 40 miles inland from Mersin, where Mobil has 56% interest in a 65,000-bbl. refinery now under construction.

A Royal Dutch-Shell company also had encouragement in a wildcat 30 miles northeast of Diyarbakir in southeastern Turkey. The well flowed 22 bbl. of 38°-gravity crude on a 108-minute test. Hopes were dashed in another test, however, after negative results on a wildcat at Kuleli, Thrace, where oil and gas shows were encountered in a joint Shell-Deilmann well.

Extensive wildcatting is in progress elsewhere in the country, and 8 out of 11 active rotary rigs were on exploration wells late this year. One operator, Esso, became discouraged and called off its program after spending $20 million, and drilling 11 dry holes.

A second refinery is being built at Izmit, near Istanbul, by Caltex and a government company. The government now operates the small plant at Batman, along with crude production in the vicinity.

TURKEY PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Bulgardag, 1960	4,700	(1)	....	.....	.....	36
Garzan, 1950	4,750	.....	30	3,250	2,795,850	26.6
Germik, 1958	6,300	.....	1	90	53,480	20.5
Kahta, 1958	4,000	.....	3	361	170,000	11

TURKEY PRODUCTION (Continued)

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Kuleli, 1960	8,800	(2)	....	....	....	
Raman, 1945	4,400	....	22	3,400	8,745,176	20.6
Total			56	7,101	11,764,506	

(1) Two-well field not on production. (2) Field discovery.

TURKEY REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking Thermal	Cracking Catalytic	Reforming	Other processing
Shell, B.P., and Socony:					
Mersin	(1)	.....	.....	.....	.....
Caltex-Trukpet, Izmit	(2)	.....	.....	.....	.....
Turkiye Petrolleri, A.O., Batman	[3]6,950	.....	3,000 TCC	.....	1,400 V, 1,300 A
Total	6,950	.....	3,000	.....	

(1) 65,000-bbl.-daily refinery under construction. (2) 20,000-bbl.-daily refinery planned. (3) Plans call for doubling crude capacity.

ASIA-PACIFIC

AUSTRALIA

AUSTRALIA'S vast basins continue to mystify oil hunters, and commercial crude production, if there, remains to be found in some future year. Most potential oil areas are now covered by permits issued to combinations of international, independent, and local companies. More acreage was taken out this year, but most of the rigs on the subcontinent at the present time are stacked, at least for the time being.

A closely watched wildcat, Betcota 1 in Queensland, was abandoned this year at 9,824 ft. by Delhi Australian, operator for the Delhi-Frome-Santos group. But hopes for commercial gas production were raised with a find at Pickanjinnie, near Roma, Queensland, which tested 5.7 M.M.c.f. daily. Three other wells in this Queensland area also are natural-gas producers.

Drilling progressed on Iehi in Papua, Australian New Guinea, after operations were slowed at midyear by torrential rains. Nearly 40 in. fell in 1 week. British Petroleum and a local company, Oil Search, Ltd., financed the test alone after Stanvac withdrew support from the project.

Stanvac plans a new refinery at Adelaide, South Australia, and elsewhere construction is under way on individual processing units and petrochemical facilities. Shell is adding an 11,750-bbl. cat cracker and an ethylene plant at Clyde refinery. Construction also is in progress on a $50-million petrochemical complex being built in conjunction with Stanvac's Altoona refinery.

AUSTRALIA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking Thermal	Cracking Catalytic	Reforming	Other processing
Australian Oil Refining, Ltd., Kurnell	[2]45,000	.....	25,000 FCC	.....	24,000 V, 2,500 Poly
Bitumin & Oil Refineries, Ltd., Laverton	15,000	.....	.....	2,300 Pf	7,000 Un, 840 A
B. P. Refinery (Kwinana), Ltd., Kwinana	[1]70,000	.....	12,500 FCC	16,000 Pf	24,000 V, 5,600 CH, 500 A
Shell Refining (Australia) Ptg., Ltd.:					
Clyde	20,000	.....	(3)	6,700 Pf	.....
Geelong	50,000	.....	17,500 FCC	6,700 Pf	11,000 H
Standard-Vacuum Refining Co., Ltd., Altona	41,000	.....	23,500 TCC	5,500 Sf	1,400 V, 10,000 CH, 1,700 Alky, 670 L, 1,200 A
Total	241,000	.....	78,500	37,200	

(1) 2,000-bbl. lube unit under construction. (2) 45,000-bbl. additional crude capacity under construction plus 24,000-bbl. vacuum unit, 18,000-bbl. fluid cat cracker, and 3,400-bbl. sulfuric acid alkylation unit. (3) Plan to add 24,000-bbl catalytic cracker.

BRITISH BORNEO

OUTPUT HAS SLIPPED in British Borneo with a decline in the 31-year-old Seria oil field which has already produced more than a half-million barrels. Production of 96,081 bbl. daily the first half of the year from Seria and small Jerudong oil field, operated by Brunei Shell Petroleum, and from Miri, operated by Sarawak Shell Oilfields, was down to 93,127 bbl. daily in June.

Two wildcats, Engkaban 1, taken to 11,068 ft., and Engkaban 2, drilled to 1,600 ft. were drilled by Sarawak Shell. Brunei Shell was drilling at 9,154 ft. in East Jerudong 1 at midyear.

WORLD WIDE OIL

BRITISH BORNEO PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping*	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Jerudong, 1955	3,523-4,021	2	....	333	470,177	40-42
Miri, 1911	300-6,270	....	179	1,180	72,724,694	17-46
Seria, 1929	834-10,201	120	*216	94,568	502,397,664	10-48
Total		122	395	96,081	575,592,535	

*Includes artificial lift.

BRITISH BORNEO REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Sarawak Shell Oilfields, Ltd., Miri-Lutong	46,000	.....	.....	.....	.....
Total	46,000	.....	.....	.....	.....

BURMA

THE BURMESE GOVERNMENT has taken control of the oil industry by increasing its ownership in Burma Oil Co. (1954) Ltd. from 33⅓ to 51%. Partners in the operating company are Burmah Oil Co., Indo-Burma Petroleum Co., and British Petroleum Co., which before World War II handled exploration, production, refining, and marketing operations in the country.

Under the terms of the agreement, the private companies will spend $5.6 million per year on exploration for at least 3 years. The country is still self-sufficient for crude production and refining capacity. But imports will be required soon unless new production is found. The latest wildcat is a projected 12,000-ft. test near Pogaung in the Tharawaddy District, northwest of Rangoon. Earlier in the year, "encouraging gas production" was reported in a test at Payagon, southwest of Rangoon.

BURMA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Chauk-Lanywa, 1902	2,500	28	393	9,800	309,600,000	36
Others	....	....	....	1,000		
Total	.....	.....	.....	10,800	309,600,000	

BURMA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Burmah Oil Co. (Burmah Concessions), Ltd.:					
Chauk	5,800	1,700	.....	.....	.....
Syriam	5,300	.....	.....	.....	.....
Total	11,100	1,700	.....	.....	

FORMOSA

CRUDE PRODUCING operations continue on Formosa under Chinese Petroleum Corp., but production is negligible. The company's refinery, however, makes the island self-sufficient for most products.

FORMOSA (TAIWAN) PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Chin Shui, 1913	8,000	2	....	20	.....	40-44
Chuhuang Keng, 1904	2,500	1	22	25	.....	32-35
Chutouchi, 1940	2,500	2	2	1	.....	38.9
Shantzechiao, 1954	1,400	....	2	25	.....	41.2
Total		5	26	71	.....	

FORMOSA (TAIWAN) REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Chinese Petroleum Corp., Kaoshiung	28,000	4,000 Vis	10,000 TCC	2,500 Cat	2,000 V, 900 Alky, 700 A
Total	28,000	4,000	10,000	2,500	

INDIA

THE PROBLEMS of world-wide crude surplus and competition from low-priced Russian oil came home to roost in India this year with effects that helped shake the free-world oil industry.

A marketing chain reaction started when the Indian Government asked private refiners, Caltex, Burmah-Shell, and Stanvac, to process Russian crude. The companies refused, but soon after reduced the price on their own imports from the Middle East. This move, in turn, was one of the factors underlying the general Middle East price cut during the summer.

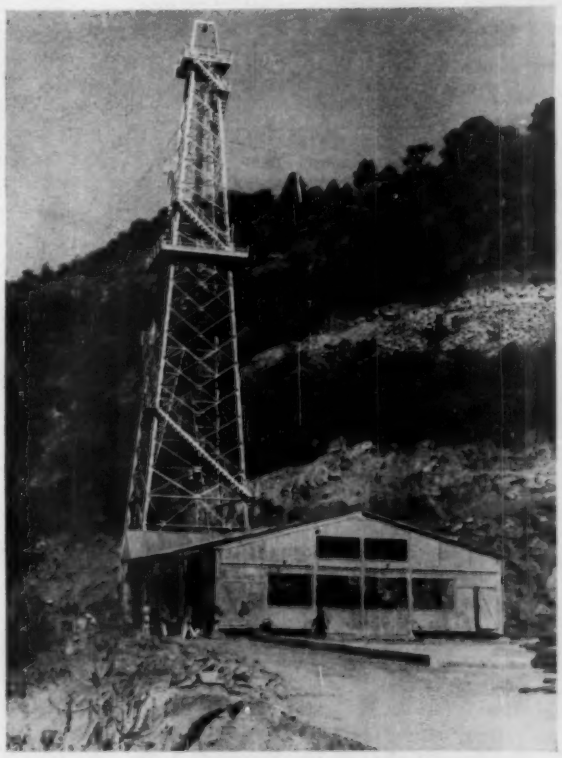
India also agreed to buy about 11 million barrels of Russian products in the next 3 to 4 years in a move designed to force down the price of products sold locally. The program got off to a bumpy start, however, because the government had neither a marketing organization nor facilities to market the oil. Private companies also underbid the government for outlet's counted on by the state company, Indian Oil. As a result, Russia was asked to temporarily suspend shipments. Stanvac also gave up duty protection on all refined products, a move made by Burmah-Shell last year, when the government complained the protection enabled the company to underbid Indian Oil on price.

The government is pressing forward development programs in the Cambay and Ankleshwar areas in western India, north of Bombay. Nine wells, some of them in the 400 to 500-bbl.-daily class, have been completed at Cambay, and commercial production is scheduled to begin next year. The Ankleshwar find tests 2,100 bbl. daily. Evaluation drilling is still in the early stages. The government program is being carried out with the help of Russian and Romanian crews and equipment.

Stanvac is seeking a concession in Northwest India under the government's program to encourage further exploration by private companies in addition to its own effort. The company has given up a 10,000-sq.-mile block in the Bengal basin after 10 dry holes in 6 years. The government had 25% interest in the venture.

Construction is in progress on a 720-mile 16-in. and 14-in. pipeline system from the Nahorkatiya area, which can produce more than 60,000 bbl. daily, to refineries at Gauhati and Barauni. Oil India Private, owned two-thirds by Burmah Oil and one-third by the government, will operate the fields and pipeline system. The refineries will be government owned.

The government also is considering a series of pipelines that would deliver products to many interior centers within 5 years. One of these might be a line from Barauni to New Delhi.



THIS 142-FT.-HIGH DERRICK symbolizes India's aspirations for self-sufficiency in petroleum. The Romanian-built and manned rig is drilling at Jawalmukl, India.

INDIA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Digboi, West, 1890	3,000	53	[1]361	1,234	48,967,577	36.7
East Kharjan, 1948	4,000	32	[1]24	1,935	6,435,071	...
Moran, 1955	10,900	[3]	...	...	14,356	
Nahorkatiya, 1953	9,500	[2]5	...	5,271	6,435,971	33
Total		91	385	8,465	61,852,975	

(1) Includes gas lift. (2) 51 wells shut in. (3) 8 wells shut in.

WORLD WIDE OIL

INDIA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Assam Oil Co., Ltd., Digboi	*13,100	2,300	.....	.....	1,700 L
Burmah-Shell Refineries, Ltd., Bombay	50,000	.....	12,000	6,700 Pf	.....
Caltex (India), Ltd., Visakhapatnam	15,000	.....	8,400 FCC	.....	7,500 V, 850 Poly
India Refineries, Ltd.:					
Barauni	(2)	.....	.....	.....	.....
Gauhati	(1)	.....	.....	.....	.....
Gujarat	(3)	.....	.....	.....	.....
Standard-Vacuum Refining Co. of India, Bombay	38,000	.....	7,700 FCC	3,800 T	250 Poly, 750 A
Total	116,100	2,300	28,100	10,500	

*Throughput averages 9,700 bbl. daily. (1) 15,000-bbl. refinery under construction. (2) 40,000-bbl. refinery planned. (3) Government company planning 30,000 to 45,000-bbl. refinery.

INDONESIA

PRESIDENT SUKARNO has signed a bill that could pave the way for nationalization of the oil industry if the Indonesian Parliament approves. But the government has softened the move by explaining that it plans to let Caltex, Stanvac, and Shell operate the industry on a contractual basis. One widespread opinion is that the government will attempt to use the bill as a club in securing better terms in coming tax and foreign-exchange talks.

The country ranks as one of the leading crude exporters, next to the big Middle East producers, Venezuela, and Russia. Caltex, the biggest producer with an output of over 220,000 bbl. daily some months, has a possible new find at Pematang, 43 miles northwest of Minas field, in Central Sumatra. Shell output averages about 117,000 bbl. daily, while the government produces about 17,500 bbl. daily, mostly from North Sumatran properties of Shell never returned after World War II.

Permina, the Indonesian national oil company, and Japan Petroleum Exploration Co., a semigovernment corporation, have agreed to a joint development program in the North Sumatran properties. The Japanese are advancing $52.3-million in equipment, material, and manpower in return for a minimum of about 12,000 bbl. daily of crude for at least 10 years.

INDONESIA PRODUCTION
Kalimantan (Indonesian Borneo)

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Anggana-Muara, 1902	380-3,200	.....	79	1,172	69,980,100	20.6-32.4
Balik Papan (Klandasan), 1903	740-765	.....	.....	.....	249,960	15.3
Bunju, 1930	2,020-7,850	40	5	10,312	20,663,330	24.5-32.6
Sambodja, 1910	160-4,400	.....	48	675	57,929,310	23.7-31-4
Sanga Sanga, 1897	430-2,900	.....	81	2,267	157,971,080	20.7-32.6
Sangatta, 1940	1,640-4,200	.....	.....	.....	1,150	36.0
Tandjung, 1938	2,500-4,300	[1]42	.....	[1]292	1,178,580	38.8
Tarakan, 1906	195-2,400	3	377	3,093	181,413,160	18.2
Total Kalimantan		85	590	17,811	489,386,670	
Java						
Kawengan, 1926	1,750-2,700	.....	75	3,810	73,413,180	33.2
Kruka, 1929	970-1,600	.....	43	420	9,518,970	28.3
Ledok, 1896	320-3,200	.....	.....	.....	21,299,790	43.0
Lidah Kuldon, 1896	490-1,330	.....	.....	.....	33,369,000	24.5
Nglobo-Semanggi-Banjuasin, 1897	370-3,350	.....	.....	.....	18,604,190	43.0
Total Java		.....	118	4,230	156,204,130	
Ceram						
Bula Lemun, 1897	240-920	.....	.....	.....	8,203,000	23.0
Total Ceram		.....	.....	.....	8,203,000	
Sumatra (South)						
Abab, 1951	6,000	2	....	411	1,817,777	35.0
Babat, 1901	100-1,050	.....	11	25	8,490,920	36.5
Badjubang, 1927	2,700-3,300	6	25	1,651	35,429,060	44.7
Benakat, 1933	1,500	47	*63	11,900	85,147,063	36.0
Betun, 1949	6,500	2	3	228	3,752,400	35.0
Betung, 1923	180-950	.....	.....	.....	2,165,770	40.5

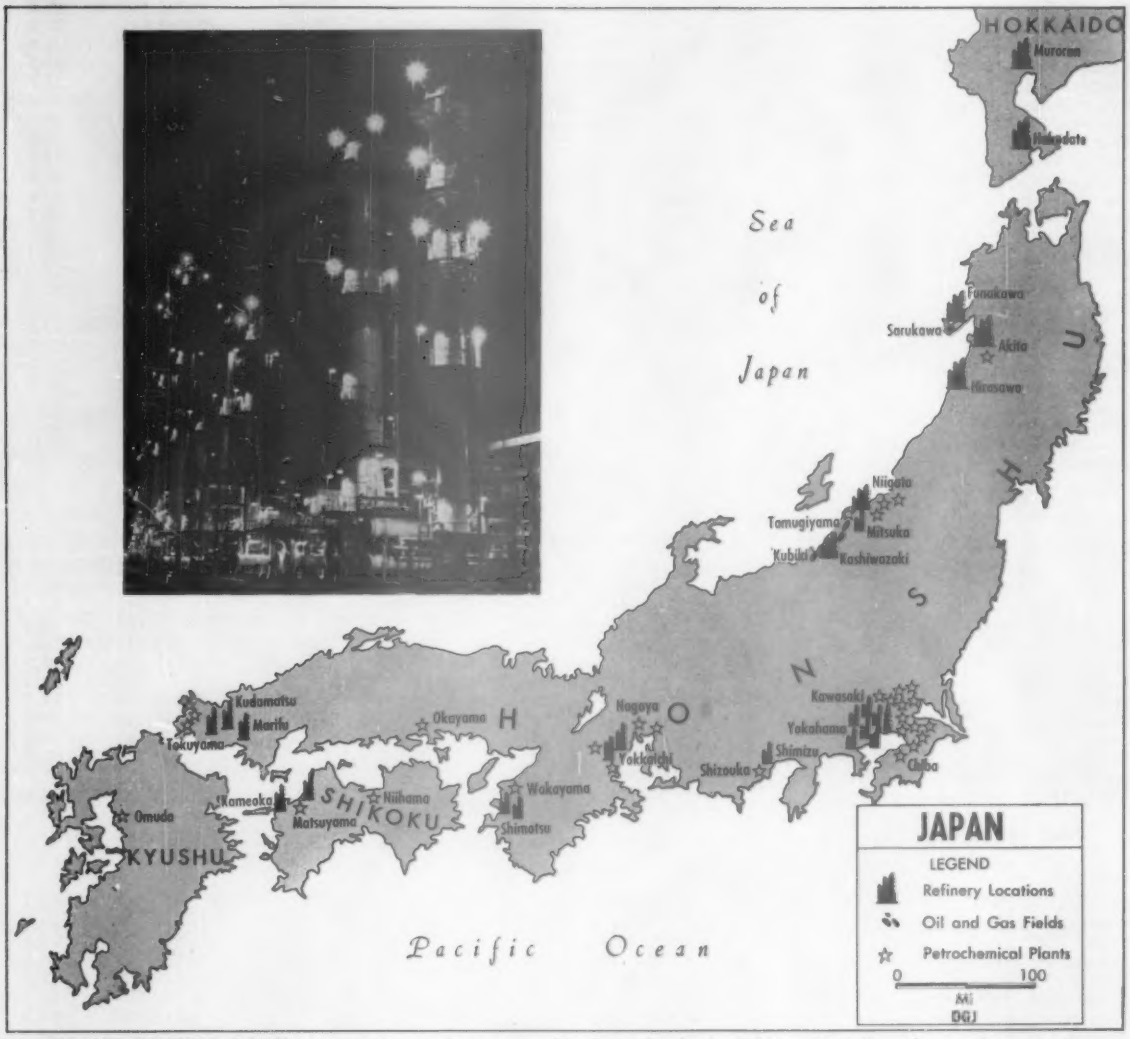
INDONESIA PRODUCTION (Continued)

Name of field—Discovery date—	Depth (ft.)	No. of wells—Flowing	No. of wells—Pumping	Production in bbl.—Daily avg. 1st 6 mos.	Production in bbl.—Cumulative	Gravity °API
Dexas, 1951	6,000	1	....	298	438,106	35.0
Djirak, 1930	900	2	*66	3,613	42,446,318	37.0
Gunung Kemala, 1938	6,200-6,340	12	4	2,183	15,425,140	38.0
Karang Ringing, 1903	160-1,200	....	....	.....	1,510,110	42.5
Keban, 1941	1,180-1,800	2	....	164	76,100	55.7
Kenali Asam, 1931	1,150-4,020	26	101	10,204	68,412,780	23.8-40.5
Kluang, 1914	2,300-2,600	....	....	.....	28,704,430	40.0
Kruh, 1941	3,300	....	....	.....	1,474,777	38.0
Limau, 1928	4,450-5,350	67	36	42,995	73,152,210	29.0
Mangundjaja, 1935	660-2,200	1	32	1,293	17,642,890	24.8
Meruo Senami, 1938	2,400-2,650	3	....	66	371,200	45.9
Prabumlih West, 1953	4,740-5,640	4	....	1,140	6,981,280	32.9
Radja, 1940	6,500	16	1	1,493	13,353,775	40.0
Sei Taham, 1903	300-1,150	1	....	23	28,802,360	43.1
Selo, 1937	1,900	1	1	136	211,609	36.0
Setiti, 1936	1,850-1,970	1	13	760	1,646,000	27.2
Suban Djerigi, 1905	1,300-2,500	....	13	275	37,139,380	44.6
Sungei Gelam, 1958	1,370-4,700	2	....	61	65,790	45.8
Talang Akar-Pendopo, 1922	2,800	162	97	31,994	298,593,850	37.0
Talang Djimar, 1937	3,600-4,200	29	94	13,478	113,658,440	29.0
Tandjung Tiga, 1940	4,400-4,600	11	39	8,064	24,985,100	28.5
Tempino, 1931	1,930-2,700	6	103	7,128	68,643,680	41.1
Tg. Luntar, 1912	2,200-2,800	....	....	.....	4,312,900	56.0
West Tandjung Mining, 1938	4,210-5,040	4	....	935	419,700	31.1
Others	....	....	....	.....	111,674	....
Total South Sumatra		8	702	140,518	985,382,589	
Sumatra (Central)						
Andan, 1958	....	....	3	1,047	190,472	....
Bekasap, 1955	2,500	....	....	.....	12,269	36.0
Duri, 1940	600	....	225	(1)	(1)	22.0
Kotobatak, 1952	4,600	....	....	.....	4,896	32.0
Lirik, 1939	1,600	....	*14	4,073	2,220,922	34.0
Minas, 1944	2,400	45	105	193,616	295,241,834	36.0
Molek, 1956	2,700	....	....	.....	908	34.0
North Pulai, 1957	1,800	5	*8	5,525	2,333,203	34.0
Pungut, 1951	2,800	....	....	.....	48,140	38.0
Sago, 1940	1,800	....	57	21,745	22,843,847	34.0
Sebanga, 1940	1,000	....	....	.....	2,369	32.0
South Pulai, 1958	....	....	3	1,002	239,546	....
Ukui, 1940	1,800	....	*7	1,527	333,534	34.0
Total Central Sumatra		50	422	228,535	323,471,940	
North Sumatra[2]						
Djrajeu, 1929	2,520-2,590	....	....	.....	559,000	54.5
Gebang, 1936	2,970-3,400	....	....	.....	135,000	54.0
Pace, 1939	2,520-2,590	....	....	.....	559,000	34.5
Pangkalan Susu, 1927	1,550-2,100	....	....	.....	6,287,000	56.0
Perlack, 1900	160-2,200	....	....	.....	47,870,000	57.0
P. Tabuhan, 1937	3,300-3,500	....	....	.....	3,283,000	52.5
Pulu Pandjang, 1928	1,640-2,400	....	....	.....	11,243,000	55.5
Rantau, 1929	1,040-2,560	....	....	.....	55,513,000	48.5
Seranga Djaja, 1926	3,560-4,150	....	....	.....	7,551,000	64.5
Telaga Said D.K.G., 1893	210-720	....	....	.....	23,621,000	51.5
Total North Sumatra		....	....	.....	156,621,000	
Total Sumatra		458	1,124	369,053	1,465,475,529	
Total Indonesia		543	1,832	391,094	2,119,269,329	

*Includes gas lift. (1) Field production only. Shut in awaiting pipeline. (2) Included in Minas figures.

INDONESIA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking—Thermal	Cracking—Catalytic	Reforming	Other processing
N.V. de Bataafsche Petroleum Mij.:					
Balik Papan	75,000	.....	.....	.....	.....
Pladju	114,000	10,000	.....	15,000 T	.....
Tjepu	4,600	.....	.....	.....	.....
Wonokromo	3,200	.....	.....	.....	.....
N.V. Standard-Vacuum Pet. Mij., Sungei Gerong	77,000	27,000	20,000 FCC	.....	25,500 V, 800 Alky, 1,250 Poly
Total	273,800	37,000	20,000	15,000	



JAPAN'S POSTWAR BOOM in petrochemicals is exemplified in Synthetic Rubber Co.'s butadiene plant, inset.

JAPAN

THE JAPANESE oil industry is enjoying a boom that is expected to see demand rise 50% to nearly 770,000 bbl. daily by 1963 and to 1,530,000 bbl. daily by 1970.

Most marketing is done by affiliates of western companies: Stanvac, with 55% interest in Toa Nenryo Kogyo; Caltex, with 50% in Nippon Oil; Shell, with 50% in Showa Oil; and Tidewater, with 49% in Mitsubishi. But three big independents, Idemitsu, Maruzen, and Daikyo, handle about 30% of total sales and are growing both in volume and share of the market.

The government is promoting a series of industrial complexes each of which will include refining, petrochemical, iron and steel manufacturing, and power-generating facilities. These will supply suitable secondary industries in the same area. Similar complexes are already located at Kawasaki and Yokkaichi, while others either under study or in the development stage are at Chiba, Nagoya, and Sakai, in Osaka Prefecture, and Mizushima, in Okayama.

Two Japanese groups are developing foreign crude supplies. Tokyo-based Arabian Oil Co. has completed five wells in the 6,000-bbl.-daily-or-better class, in the Persian Gulf off the Neutral Zone. The company will start importing supplies to Japan early in 1961. The semigovernment Japan Petroleum Exploration Co. (Japex) has made a deal for at least 12,000 bbl. daily for 10 years from fields in North Sumatra controlled by the Indonesian Government.

Modest exploration success is being achieved in domestic exploration. Commercial production has started from Tsuchizaki oil field found less than 2 miles offshore by Japex off northwest Honshu. Gas reserves were increased when Teikoku Oil tested a gas strike at Kubiki, at 35,000 M.c.f. daily.

JAPAN PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping*	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Amarume, 1960	2,904	....	....	....	3,072	33.0
Asahikawa, 1908	510-1,130	....	172	96	4,533,427	20.2
Barato, 1958	1,320	6	12	206	92,319	29.3
Fukura, 1958	2,690	1	....	128	144,944	45.3
Hachimori, 1938	570-2,150	2	22	33	618,952	17.0
Higashi Niigata, 1959	4,752	2	....	7	2,168	49.9
Higashiyama, 1893	180-2,580	....	194	165	7,695,133	26.1
Innai, 1923	970-3,490	2	200	399	7,538,831	19.4
Kita Konoura, 1958	3,630	....	....	....	1,493	24.0
Kotaki, 1938	760-1,890	....	67	60	640,978	18.6
Kubiki, 1934	3,250-3,640	....	*13	327	221,939	20.5
Kurokawa, 1912	440-1,720	....	81	57	7,657,588	15.9
Mitsuke, 1958	5,610	6	....	2,077	520,884	37.0
Niitsu, 1896	190-4,730	....	434	414	18,434,367	17.9
Nishiyama, 1888	660-5,940	3	221	134	18,864,785	34.8
Offshore Tsuchizaki, 1959	2,145	3	....	830	20,826	31.1
Sarukawa, 1958	2,640	12	....	744	222,565	35.0
Shonai, 1944	340-950	3	30	167	1,237,561	18.6
Tamugiyama, 1956	3,960	7	2	278	253,171	47.6
Yabase, 1933	220-5,620	....	*367	4,661	25,796,109	37.8
Total Japan		47	1,815	10,783	94,501,112	

*Includes artificial lift.

JAPAN REFINING

(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Daikyo Oil Co., Yokkaichi	55,000	.....	3,500 HD	3,000 Hf	14,000 V, 1,300 L, 3,000 CH
General Oil Co., Kawasaki	35,000	.....	.....	.....	.....
Idemitsu Kosan:					
Tokuyama	80,000	.....	7,000 FCC	8,000 Pf	20,000 V, 9,000 CH
Kawasaki	(1)	.....	.....	.....	.....
Koa Oil Co., Marifu	33,300	.....	5,500 FCC	3,300 Pf	11,500 V, 5,500 C
Maruzen Oil Co.:					
Chiba	(2)	.....	.....	.....	.....
Shimotsu	37,500	.....	5,000 FCC	.....	12,260 V, 1,750 L
Matsuyama	35,000	.....	.....	3,000 Pf	4,000 CH
Mitsubishi Oil Co.:					
Kawasaki	51,620	.....	.....	5,500 Pf	3,800 V, 12,500 CH, 1,000 L
Mizushima	(3)	.....	.....	.....	.....
New Asia Oil Co.:					
Hokodate	12,000	.....	.....	.....	1,500 V
Yokohama	13,000	.....	.....	1,300 CR	750 V
Nichimo Oil Refg. Co., Kawasaki	17,000	.....	.....	.....	.....
Nippon Mining Co.:					
Funakawa	19,350	.....	.....	.....	1,500 V, 1,100 L
Mizushima	(4)	.....	.....	.....	.....
Nippon Oil Co.:					
Akita	4,000	.....	.....	.....	2,000 V
Niigata	7,500	.....	.....	1,600 Pf	2,000 V
Kashiwazaki	1,500	.....	.....	.....	.....
Nippon Pet. Refg. Co.:					
Yokohama	43,400	.....	6,300 FCC	3,300 CR	8,000 V, 7,980 L
Kudamatsu	16,500	.....	.....	1,650 Pf	3,300 V, 1,550 L
Muroran	7,500	.....	.....	.....	.....
Showa Oil Co.:					
Kawasaki	26,000	.....	.....	1,500 Pf	3,000 V, 1,500 L
Hirasawa	3,000	.....	.....	.....	1,000 V
Niigata	11,000	.....	.....	.....	1,600 V
Showa Yokkaichi Oil Co., Yokkaichi	40,000	.....	12,000 FCC	.....	23,500 V
Toa Nenyro Kogyo Co.:					
Wakayama	57,000	.....	10,200 FCC	4,700 Fhy	15,500 V, 3,500 L, 1,250 Alky
Shimizu	43,500	.....	.....	4,600 Fhy	3,800 V, 660 L
Kawasaki	(5)	.....	.....	.....	.....
Toa Oil Co., Kawasaki	12,000	.....	.....	.....	.....
Taiyo Oil Co., Kameoka	22,000	.....	.....	.....	10,000 V
Total	683,670	.....	49,500	41,450	

(1) Plan 50,000-bbl. refinery for completion mid-1964. (2) 60,000-bbl. refinery planned. (3) 40,000-bbl. refinery under construction. (4) Plan 40,000-bbl. refinery. (5) Plan 30,000-bbl. refinery for 1964 completion.

WORLD WIDE OIL

NETHERLANDS NEW GUINEA

SMALL crude production leveled off at about 4,500 bbl. daily late this year in three small fields held jointly by Royal Dutch-Shell, Stanvac, and Caltex. No exploration is in progress.

NETHERLANDS NEW GUINEA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells		Production in bbl.		Gravity °API
		Flowing	Pumping	Daily avg. 1st 6 mos.	Cumulative	
Kiamono, 1936	300		29	3,816	19,595,687	18.8
Mogoi, 1940	1,250		13	200	4,302,207	42.8
Wasian, 1940	2,900-3,225	1	5	268	1,656,400	41.9
Total		1	47	4,284	25,554,294	

PAKISTAN

PAKISTAN will be self-sufficient for most products within 2 years with the completion of a 30,000-bbl. refinery at Karachi. Caltex, Stanvac, Shell, and Burmah Oil will hold 60% interest, and local sources the rest.

Expensive exploration continues. But outside of local successes in the cluster of small fields in northern West Pakistan, there still has been no major oil strike. Sun Oil is starting the first well in its concession area in a joint venture with Pakistan Petroleum, which is serving as operator. Russia this year got its foot in the door when the government agreed to let the Soviets assist in the oil search.

The government is considering a 1,000-mile gas system into northern West Pakistan from Sui field. The project would include a loop to the existing 310-mile 16-in. line from Sui to Multan. Pakistan Petroleum this year completed Sui 7 at 4,450 ft. as the best well so far, with an open-flow potential of 140 M.M.c.f.d.

PAKISTAN PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells		Production in bbl.		Gravity °API
		Flowing	Pumping	Daily avg. 1st 6 mos.	Cumulative	
Balkassar, 1946	8,000		4	1,300	12,670,000	21.3-26.0
Dhulian, 1957	7,600-9,200	(*)	(*)	(*)	11,300,000	36.3-45.1
Joya Mair, 1944	7,000	(*)	(*)	(*)	1,529,000	19.0
Karsal, 1959	11,600		1	20	16,000	
Khaur, 1915	5,200	(*)	(*)	(*)	3,560,000	36.9
Total				[1]7,600	29,075,000	

(1) Estimated. *Pakistan Oilfields, Ltd., subsidiary of Attock Oil Co., will not reveal individual field data.

PAKISTAN REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking		Reforming	Other processing
		Thermal	Catalytic		
Attock Oil Co., Ltd., Rawalpindi	6,000				
Shell-Burmah-Caltex-Stanvac, Karachi	(1)				
Total	6,000				

(1) 30,000-bbl. refinery planned by four-company combine.

PHILIPPINES

THREE refinery programs in progress in the Philippines will give all local marketers a local source of products within a few years. Shell has started work on a 25,000-bbl. plant at Tabango, 75 miles south of Manila, and Gulf Oil and local interests have awarded contracts for a 10,000-bbl. plant. Work is well advanced on Stanvac's 25,000-bbl. plant which is being built on Bataan.

PHILIPPINES REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking		Reforming	Other processing
		Thermal	Catalytic		
Caltex (Philippines), Inc.	26,000		7,500 FCC		13,000 V, 950 Poly
Gulf-Philippine Investment, Luzon	(1)				
Royal Dutch-Shell	(2)				
Standard-Vacuum Oil Co., Bataan	(3)				
Total	26,000		7,500		

(1) Plan 10,000-bbl. refinery. (2) Plan 20,000-bbl. refinery. (3) 25,000-bbl. refinery under construction.

THAILAND

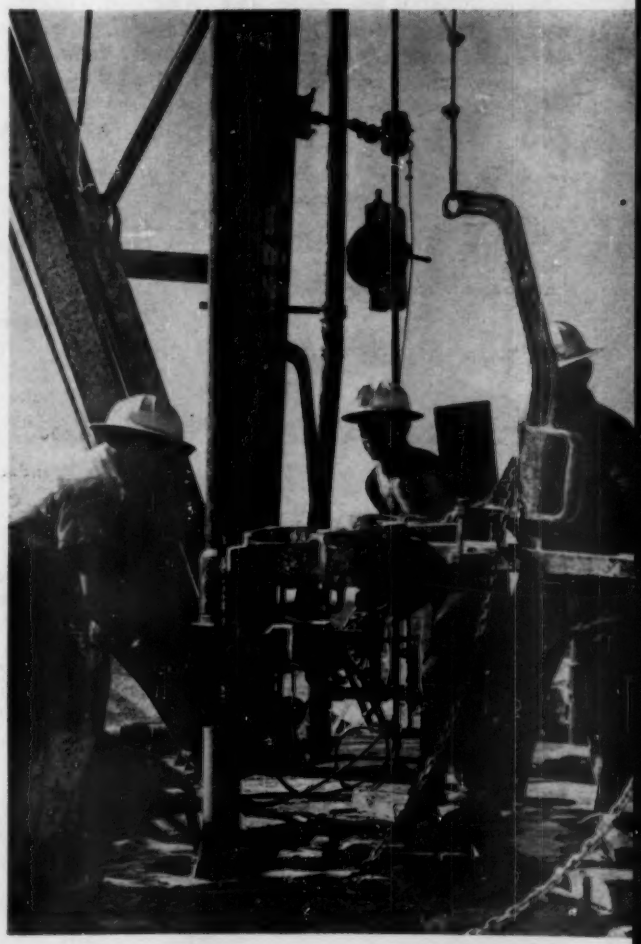
THE THAILAND GOVERNMENT has made definite commitments for a small, 5,000-bbl. refinery near Bangkok, while at the same time keeping alive plans for a projected 28,000-bbl. plant in the same area. Indiana Standard withdrew from building the larger plant when Thailand insisted on a provision the refinery be turned back to the government after having operated for 10 years.

SINGAPORE REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking		Reforming	Other processing
		Thermal	Catalytic		
Shell Refining Co. (Singapore), Ltd.:					
Pulan Bukom	(1)	.....	.....	.....	.....
Maruzen-Toyo	(2)	.....	.....	.....	.....
Total	.....	.....	.....	.....	

(1) 20,000-bbl. refinery under construction, due on stream late 1961. (2) 20,000-bbl. refinery planned.

WESTERN HEMISPHERE (Excluding U. S. and Canada)



ARGENTINA has definitely turned the corner in its struggle for self-sufficiency in oil. Shown above is a crew working on Rig 28 in Mendoza, Argentina.

WORLD WIDE OIL

ARGENTINA

ARGENTINA'S PRESIDENT Arturo Frondizi late this year made another bold move to cure his country's oil problems. This was a decree opening exclusive preserves of the state-owned YPF to private development. The YPF board of directors resigned in protest. But President Frondizi again appeared to be riding out the opposition as he did 2 years ago when he first opened the country to foreign oil capital. The new move is expected to lead to important agreements with Esso and Shell for development of the area.

The country has definitely turned the corner in its struggle for self-sufficiency in oil. Crude output by late summer was more than 186,000 bbl. daily and rising rapidly. Most production is still handled by YPF. But private companies under contract to YPF are now completing wells at a faster rate than the agency.

By July, L. R. Development, headed by the New York banking firm of Carl M. Loeb Rhoades, was producing 17,800 bbl. daily. Pan American (Indiana Standard) was moving 23,100 bbl. daily through a new 83-mile 12 and 14-in. crude pipeline to the coast from its development area in Comodoro Rivadavia. Rated capacity of the system is 50,000 bbl. daily. Another 19,000 bbl. daily was made available in September when Tennessee Gas Transmission Co. opened a 2-mile 14-in. crude-line outlet from production it is developing on Tierra del Fuego. Another 9,000 bbl. daily is produced by Esso, Shell, and two local companies on old properties.

YPF imported its last tanker of crude this year, a big step on the road to self-sufficiency expected by 1964, if not earlier. Esso and Shell, however, continue to bring in some crude for their own refineries.

The state agency also inaugurated the first of a pair of twin lines from Salta fields in northern Argentina. This is a 920-mile 12-in. section that will carry products to a terminal at San Lorenzo refinery. Most of the supply is from a gasoline plant at Campo Duran.

A parallel 1,100-mile 24-in. natural-gas line continuing on to Buenos Aires is nearing completion. YPF plans a second major gas system to Buenos Aires from Comodoro Rivadavia. Texas Eastern Transmission Corp. has submitted a $380-million proposal for construction and operation of the system.

ARGENTINA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Chubut and Santa Cruz Provinces					
Comodoro Rivadavia, 1907	5,900	3,957	88,508		22.8-24.5
Neuquen Province					
Plaza Huincul, 1918	3,900	503	16,895		30.0
Salta Province					
Campo Duran and others, 1930	13,120	70	15,215		22.5-54.0
Mendoza Province					
P. Colorados, Barrancas and others, 1934	7,500	279	27,418		
Total		4,809	148,036	743,[illegible] 50,785	

ARGENTINA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Cia. Condor, Avellaneda	900				
Cia. La Isura, S.A., Bahia Blanca	2,000				
Diadema Argentina, S.A. de Petroleo, Buenos Aires	[1]24,000	26,000		3,300 T	
Esso, S.A., Petrolera Argentina:					
Bahia Blanca	10,000	5,000 Vis			
Campana	[2]42,000	20,000 Vis			1,100 L, 1,250 A, 7,000 V
Dadin (Plaza Huincul)	500				
Manuel Elordi	1,500				
Lottero y Papini—Avellaneda	750				
Yacimientos Petroliferos Fiscales:					
La Plata	[3]100,000	3,500 17,600	17,600 FCC		15,000 V, 1,600 Alky, 1,000 Poly, 500 L, *570 C, *270 A
San Lorenzo	27,000	13,600 Vis			
Lujan de Cuyo	15,000	2,000 8,800 Vis			

ARGENTINA REFINING (Continued)
(Barrels per stream day)

Company—Refinery location—	Crude	Thermal	Production in bbl. Catalytic	Reforming	Other processing
Chachapoyas	4,000	1,100	.....	.....	.....
Dock Sud	7,000	2,400	.....	.....	1,500 V, 440 L
Plaza Huincul	2,800	500	.....	.....	.....
Total	237,450	100,500	17,600	3,300	

*Tons daily. (1) Adding 24,000-bbl. crude unit, 10,000-bbl. FCC unit. (2) Plan 33,000-bbl. crude unit and 16,000-bbl. cat cracker. (3) Plan additional 20,000-bbl. crude capacity, 570-ton-daily coke capacity, and 500-ton-daily asphalt unit.

BOLIVIA

AFTER 4 years of search Gulf Oil this year made a 325-bbl.-daily discovery 30 miles northwest of Santa Cruz. The venture, in which Williams Brothers, Falcon Seaboard, and Berry & Reiner, of Tulsa, share a 20% interest, is one of the most promising developments in years of work by Gulf Oil and more than a dozen other firms, working either on concessions or under contract to YPFB on reserved acreage.

Fish Engineering and its partners in Bolivian Oil Co. will supply distillate from gas wells in Madregones field, which straddles the Argentine-Bolivian border, for the new 920-mile 12-in. products pipeline to San Lorenzo, Argentina.

The U. S. Government made an exception to its policy of not loaning money to state oil companies by approving a $2.7-million grant to YPFB. The agency, which handles all the country's crude production, will use the loan to purchase equipment.

BOLIVIA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Arrozales, 1957*	....	.....	.....	.....	.....	..
Barredero, 1958*	....	.....	.....	.....	.....	..
Bermejo, 1924	2,624-3,280	6	3	232	2,022,000	20-25
Buena Vista, 1924*	....	.....	.....	.....	.....	..
Camatindi, 1958*	6,550	.....	.....	.....	.....	45
Camiri, 1927	2,250-4,428	61	10	6,648	19,834,424	50-55
El Palmar, 1958*	....	.....	.....	.....	.....	..
Guairuy, 1947	1,902-2,624	9	.....	351	1,309,125	53-55
Guapoy, 1924*	....	.....	.....	.....	.....	..
Itapirenda, 1956	2,820-4,150	1	1	72	17,037	50-55
Madrejones, 1959	4,060-4,140	2	.....	1,416	75,045	..
Sanandita, 1926	1,312-2,624	.....	7	57	2,155,388	30-35
San Telmo, 1924*	....	.....	.....	.....	.....	..
Toro, 1955	1,312-3,936	9	9	962	1,144,775	21-54
Yaguacua, 1958*	....	.....	.....	.....	.....	..
Total		88	30	9,738	26,557,794	

*Shut-in fields. Country has 48 shut-in wells including those in these fields.

BOLIVIA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking Thermal	Cracking Catalytic	Reforming	Other processing
Yacimientos Petroliferos Fiscales Bolivianos:					
Camiri	1,200	.....	.....	.....	.....
Cochabamba	6,000	.....	.....	.....	200 L
Sucre	4,000	.....	.....	.....	.....
Total	11,200	.....	.....	.....	

BRAZIL

DESPITE years of effort by the state oil monopoly, Petrobras, Brazil continues to be squeezed between a high level of consumption and inadequate crude production and refining capacity. Demand of more than 300,000 bbl. daily is nearly four times crude output from Bahia fields. The refining picture is better, but actual runs of 184,400 bbl. daily in July left a wide gap in products. This gap had to be filled by imports.

The government will take about 12,000 bbl. daily over the next 3 years in a barter agreement with Russia. In exchange for crude, products, and equipment, Brazil will ship coffee and other agricultural products.

WORLD WIDE OIL

BRAZIL PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Agua Grande, 1951	830-4,300	130	48,571	44,124,937	38-42
Aratu, 1942*	1,560-2,480	16	.....	57,222	44
Autas Mirim, 1960	3,640	1	8	1,535	32
Buracica, 1959	2,480	26	1,207	227,651	31
Candeias, 1941	3,280-7,900	116	12,211	21,913,609	30-33
Cassarongongo, 1959	5,400	4	87	22,457	34
Dom Joao, 1947	980	250	3,915	5,443,771	33-38
Itaparica, 1942	1,800-2,500	25	289	619,381	25-38
Jacuipe, 1956†	2,500	1	.....	.....	...
Jequia, 1958	4,950	2	3	12,662	35
Lobato, 1939	1,300	4	10	88,904	31
Mata de Sao Joao, 1951	1,300-3,700	31	1,428	2,509,849	38
Nova Olinda, 1954	8,860	1	.....	1,753	43
Paramirim, 1950	460-3,650	2	19	172,284	38
Pojuca, Central, 1953	4,600-4,790	6	154	48,795	38
Rio da Serra, 1951	460-3,635	12	109	87,316	38
Rio Sao Francisco, 1959	6,250	1	4	4,602	36
Sauipe	6,400	1	10	1,831	33
Socorro, 1958	4,250	1	3	463	34
Taquipe, 1959	3,950	34	6,467	1,261,992	39
Total		664	74,495	76,610,014	

*Shut in. †Gas field.

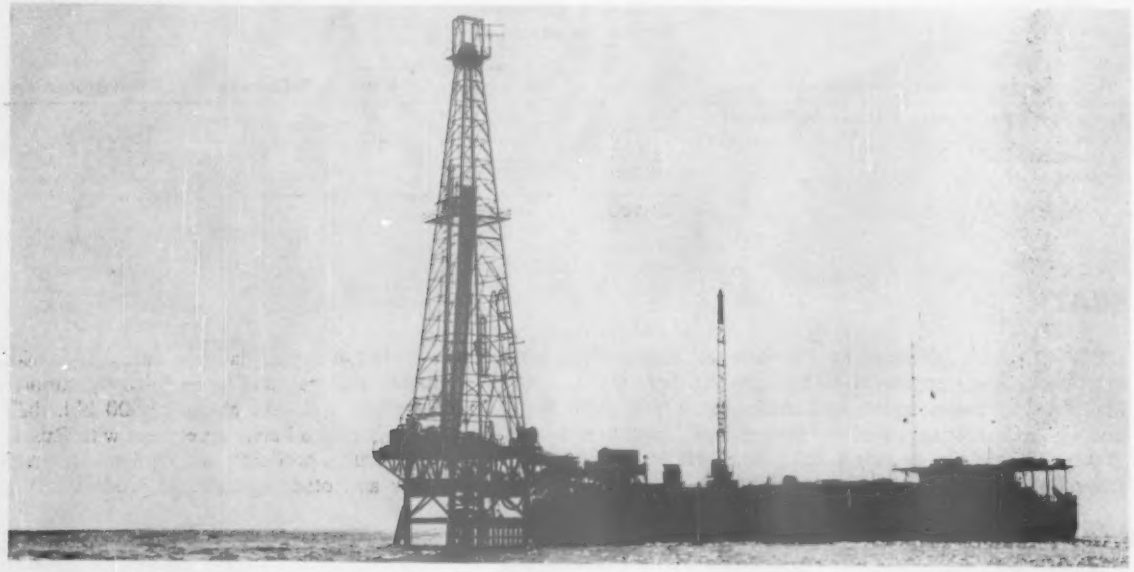
BRAZIL REFINING

(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Cia. de Petroleo de Amazonia, S.A., Manaus	5,000	.....	2,000 FCC	.....	.....
Destilaria Rio Grandense de Petroleo, Uruguaiana	300	.....	.....	.....	.....
Industrias Mafarazzo de Energia Sao Paulo	500	.....	.....	.....	.....
"Ipiranga" S.A., Rio Grande do Sul	9,300	.....	.....	.....	60 L, *70 A
Petrobras, S.A.:					
Cubatao	110,000	8,000	.....	12,000 T	3,500 A
Mataripe	[2]42,000	2,500	12,000 FCC	.....	2,800 L
Rio de Janeiro	[3]	.....	.....	.....	.....
Refineria de Manguinhos, S.A., Rio de Janeiro	10,000	6,000 4,000 Vis	.....	.....	.....
Refineria Uniao, S.A., Capuava	31,000	.....	35,000 TCC	[1]	8,000 V, 1,000 Poly
Total	208,100	20,500	49,000	12,000	

*Tons per day. (1) Plans to add 6,000-bbl. Platformer and 9,000-bbl. Unifiner. (2) Plans addition of 10,000-bbl. crude unit. (3) 90,000-bbl. refinery under construction, to include 21,300-bbl. fluid cat cracker, 11,800-bbl. Houdriformer.

EXPLORATORY WELL of Paria Operations, Inc., the POSA 112-1, drills for oil in the Gulf of Paria between the Venezuelan mainland and the island of Trinidad. Paria Operations, Inc., was formed to operate a 152,000-acre concession in the Gulf of Paria.



CHILE

EXPLORATION SUCCESS on the Chilean mainland helped increase the country's crude production to 21,500 bbl. daily by the end of the year. The additional supplies are coming from Faro Este field, on the north shore of the Straits of Magellan. ENAP, the government company, is moving out the crude via a new 35-mile 8-in. pipeline to a terminal at Bahia Gregorio.

Mainland production will increase further next year when a 50-mile 8-in. extension of the Faro Este pipeline is laid to Daniel oil field, discovered in July. Development drilling the second half of the year indicates Daniel may be Chile's best field. Four out of four wells have been completed as producers testing in the 500 to 1,000-bbl.-daily range. Twenty-five drilling locations have been selected. If the fifth well now being completed is a producer, ENAP will have 60 potential well locations. The wells are being drilled on a 40-acre spacing and production will be held down to 200 to 300 bbl. daily. Another mainland discovery, Posesion, is a gas-condensate field. Two wildcats will be started about January 1 in northern Chile, in Darapaca and Atcama provinces.

ENAP completed an expansion program at Concon refinery early this year. Esso and Shell also now operate lubricating-blending plants, along with Mobil Oil, which built a blending plant at Vina del Mar last year.

CHILI PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells		Production in bbl.		Gravity °API
		Flowing	Pumping	Daily avg. 1st 6 mos.	Cumulative	
Albatros, 1957	6,300	1	....	762	76,035	63
Augnetura, 1950	7,500	....	....	.....	21,634	...
Calafate, 1956	6,000	6	21	554	597,353	46
Catalina, 1956	5,900	3	1	227	235,255	66
Chanarcillo, 1950	7,600	5	3	441	1,421,261	46
Chaunilla, Sur, 1952	....	2	....	284	292,950	...
Chillan, 1953	7,500	10	....	668	2,344,280	46
Cullen, 1954	7,600	34	....	7,560	8,720,241	41
Daniel, 1960 (July)	5,800	....	....	.....	.....	37
Espora, 1949	6,000	....	....	.....	4,498	42
Faro, Este, 1959	7,500	3	....	882	175,001	37
Flamenco, 1954	7,500	5	1	252	518,099	46
Gaviota, 1957	6,500	2	....	208	245,574	42
Lautaro, 1957	7,200	2	....	113	145,656	42
Lynch, 1958	6,000	....	....	95	50,463	58
Manantiales, 1945	8,300	6	4	284	1,556,258	40
M. Aymond, 1958	7,200	....	....	.....	.....	...
Posesion, 1960	6,000	....	....	.....	.....	60
Punta Delgada, 1952	7,600	2	....	107	75,663	39
Punta Delgada, Este, 1958	7,500	2	....	126	192,641	40
Sombrero, 1950	7,500	15	2	2,583	7,501,064	42
Tranquilo, 1958	1,650	....	....	.....	.....	...
Tres Lagos, 1957	5,800	10	....	2,079	955,080	39
Vertientes, 1956	7,500	3	....	472	514,080	61
Victoria, Este, 1954	7,500	3	....	397	835,960	46
Victoria, Norte, 1950	7,600	....	....	....	788,810	42
Victoria, Sur, 1950	7,500	9	1	1,134	4,005,149	42
Total		123	33	19,288	31,273,005	

CHILE REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking		Reforming	Other processing
		Thermal	Catalytic		
Empresa Nacional del Petroleo, Concon	44,000	4,500 5,000 Vis	12,000 FCC	6,000 SB	10,000 V, 1,000 Alky, 6,000 CH
Total	44,000	9,500	12,000	6,000	

COLOMBIA

TWO promising oil finds this year gave Colombia its biggest exploration boost in years. Sinclair Colombian, operator on a 215,060-sq.-mile concession in Middle Magdelena Valley held jointly with International Petroleum, made one of the finds in Santos 1. The wildcat tests 1,600 bbl. daily on a 23/64-in. choke from one zone, and 1,644 bbl. daily through a choke of similar size in another. The oil horizons are in the 8,800-8,900-ft. range. The crude is 36° and 37°-gravity.

The other find, in the Colombian Llanos, was made by Texaco. Guavio 1, about 65 miles east of Bogota, was completed as a dual producer. The upper pay, topped at 6,890 ft., tests 438°-gravity crude through a ½-in. choke. The second pay, topped at 7,672 ft., tests 342 bbl. daily of 39° crude through a ⅜-in. choke.

Ecopetrol, the national oil company, has asked Forest Oil Corp. to break a contract on a secondary-recovery project in the DeMares concession area on the grounds the former government had no right to

make the agreement. The contract, which has 26 more years to run, is being defended by Forest.

Mobil International and Texaco, through their jointly owned Colombian Petroleum Co., are participating in a 140-mile 10-in. gas-pipeline project from Cicuco oil field to the Caribbean port of Barranquilla.

COLOMBIA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Baul, 1959	5,100	....	1	65	14,000	14
Buturama, 1953	6,000	2	....	230	482,833	38
Cachira, 1959	12,000	....	1	51	18,873	19
Caipal-Ermitano, 1955	5,600	1	7	562	561,000	15.8
Campo Yuca, 1957	4,800	....	1	70	45,233	35.5
Cantagallo, 1943	4,526-7,360	4	7	2,593	8,307,537	20.3
Carbonera, 1939	800	....	2	45	344,380	20.7
Casabe, 1941	2,140-5,660	....	394	19,298	144,451,169	20.7
Cicuco, 1956	8,000	12	....	25,000	14,600,000	43.4
Colorado, 1925	2,800-5,600	5	7	1,060	2,202,890	30-40
El Dificil, 1943	5,585-5,800	8	....	796	7,764,501	50.0
Floresanto, 1958	....	3	....	3	2,400	....
Galan, 1945	3,000-4,000	14	20	2,500	5,361,328	19-20
Gualanday, 1957	7,800	1	....	27	41,983	38
Infantas, 1918	600-3,500	1	310	6,800	184,458,072	24-32
La Cira, 1925	900-4,200	1	740	15,870	318,093,565	....
Las Garzas, 1957	8,370-8,460	....	....	....	52,379	31.2
Ortega, 1951	5,600	....	2	983	2,451,000	28.3
Palagua, 1954	4,000	....	92	9,842	10,370,000	15.7
Penas Blancas, 1958	5,175-7,545	....	5	2,197	1,073,763	29.7
Petrolea (North), 1933	1,500	16	6	3,000	36,135,326	46
Petrolea (South), 1937	1,000	....	....	....	42,178	....
Puerto Barco, 1958	6,300	2	....	150	266,000	45
Rio de Oro, 1937	5,000	7	9	1,300	6,146,000	44
Sardinata, 1950-58	6,100	8	13	1,000	4,393,000	36
Sogamoso, 1957	11,000	....	1	141	141,000	28.8
Tetuan, 1950	2,500	....	1	197	392,000	21.1
Tibu, 1942-57	5,500	42	224	25,000	109,816,000	34
Totumal, 1951	7,200	3	....	94	341,344	25
Velasquez, 1946	4,700-6,000	31	92	27,408	49,090,000	24
Yariqui, 1954	6,960-8,520	20	2	13,905	12,946,742	20.1
Total		181	1,937	160,187	920,406,496	

COLOMBIA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking Thermal	Cracking Catalytic	Reforming	Other processing
Colombian Petroleum Co., Tibu	5,800	....	....	....	....
Empresa Colombiana de Petroleos: Barrancabermeja	37,500	16,500 Vis	19,280 FCC	....	1,205 Alky, 400 L, 4,700 V
La Dorado	14,400	....	....	....	....
International Petroleum (Colombia), Ltd., Cartegena	29,400	....	25,100 FCC	....	17,500 V, 3,600 Poly
Texas Petroleum Co., Guamo	1,100	....	....	....	....
Total	78,200	16,500	44,380	....	

(1) Plan addition of 700-bbl. crude unit.

CUBA

CUBA'S PREMIER Fidel Castro seized Cuba's three major refineries this year in a move that started open economic warfare between his dictatorship and the U. S. Government.

The plants involved are Esso Standard's 36,500-bbl. refinery at Belot, Shell de Cuba's 27,000-bbl. refinery at Havana, and Texaco's 20,000-bbl. refinery at Santiago de Cuba. Three small, locally owned plants were taken over earlier.

Premier Castro nationalized the plants on the grounds they refused to refine Russian crude. The seizure was expected. Companies said the Cuban request was improper and illegal, and that Cuba failed to provide dollar exchange for imports. The three firms at the time of the takeover had an estimated $60 to $65 million tied up in the Cuban national bank which they were not allowed to take out of the country.

Emergency shipments of oil from Russia have so

far prevented a shortage, and the Soviets apparently have both shipping and oil available to keep the island supplied if they wish. The chief trouble encountered so far has been a series of shutdowns at Esso's Belot plant, caused by a lack of spare parts for equipment.

Exploration has been at a virtual standstill since the Castro takeover. Domestic output has slipped gradually to less than 300 bbl. daily.

CUBA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping	Production in bbl. Daily avg. July	Production in bbl. Cumulative	Gravity °API
Bacuranao-Cruz Verde	1,000-1,300	....	11	31	.....	28.8
Catalina, 1956	7,000	....	....	(*)	.....	32.0
Guanabo, 1956	1,400-2,200	....	3	....	.....	8-11
Jarahueca, 1943	500-3,000	....	6	27	.....	38-40
Jatibonico, 1954	1,100-1,300	....	21	185	.....	15-16
Motembo, 1885	400-1,700	....	[1]150	3	.....	60-62
Santa Maria, 1955	2,200-6,000	....	4	15	.....	16-28
Total		....	195	261	4,883,801	

*Shut in. (1) Production by bailing stripper wells.

CUBA REFINING[1]
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking Thermal	Cracking Catalytic	Reforming	Other processing
Bacuranao Refining Co., Bacuranao	300	.....	.....	.....	.....
Cia. Petrolera Shell de Cuba, Havana	27,000	.....	.....	5,000 Pf	.....
Esso Standard Oil Co., S.A., Belot	36,500	.....	24,000 FCC	2,600 Pwr	2,000 Hyd, 1,300 Poly, 1,000 A
Refineria Cabaiguan, S.A., Cabaiguan	2,500	500	.....	.....	.....
Santa Maria Oil Refining Co., Havana	600	.....	.....	.....	.....
The Texas Co. (West Indies), Ltd., Santiago de Cuba	20,000	.....	.....	3,300 Pf	4,100 H
Total	86,900	500	24,000	10,900	

(1) All private refineries seized by government. Major refineries are operating on Russian crude.

CENTRAL AMERICA AND OTHER

A TANKER company, National Bulk Carriers, and Continental Oil have formed a partnership for building a $30-million refinery near the entrance of Panama Canal. The plant is expected to open in 1962. A second refinery may be built by Ultramar, Ltd., a British company that last year took over Panama Refining and Petrochemical Co. of Los Angeles, which had planned a 55,000-bbl. plant in the same area.

Central America's first refinery, however, will be a 4,000-bbl. plant at Puerto Matias de Galvez, Guatemala. It is being built by Royal Dutch-Shell and Beaux Bridge Oil Refining Co. Shell also plans a $10-million refinery on the opposite side of Central America in San Salvador. The plant will be in the 10,000-bbl. class. Esso Standard is considering a 10,000-bbl. plant in the same area.

Exploration licenses are held over wide areas of Central America, but drilling is limited. Ohio Oil is operator of a four-company group that continues to wildcat without commercial success in Guatemala.

NETHERLANDS WEST INDIES REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking Thermal	Cracking Catalytic	Reforming	Other processing
Lago Oil & Transport Co., Ltd., Aruba	470,000	313,000 Vis	45,000 FCC	.....	19,200 V, 6,700 Alky
N. V. Curacaosche Pet. Industrie Mij., Curacao	210,000	85,000	35,000 FCC	20,000 T	.....
Total	680,000	398,000	80,000	20,000	

PUERTO RICO REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking Thermal	Cracking Catalytic	Reforming	Other processing
Caribbean Refining Co., Bayamon	15,200	.....	8,800 FCC	.....	9,800 V, 1,100 Poly
Commonwealth Oil Refg. Co., Inc., Guayanilla	80,000	20,000 Vis	53,600 HD	7,460 Hf	45,000 V, 10,000 Un, 1,800 Alky, 2,500 Poly
Total	95,200	20,000	62,400	7,460	

WORLD WIDE OIL

PANAMA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
D. K. Ludwig, Las Minas Bay	(2)				
Panama Ref. & Petrochemical Co., Inc., Portobello Harbor	(1)				

(1) Planned 55,000-bbl. refinery. (2) Planned 70,000-bbl. refinery.

URUGUAY REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Administracion Nacional de Combustibles, Alcohol y Portland Refineria ANCAP—Montevideo, Teja	(1)28,000	2,000			750 V, 350 A
Total	28,000	2,000			

(1) Expansion program doubling output. New units to include 28,000-bbl. crude unit, 10,000-bbl. vacuum unit, 5,000-bbl. Orthoflow "B" cat cracker, 3,000-bbl. Sinclair-Baker-Kellogg reformer, and 3,000-bbl. asphalt unit.

BARBADOS REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Barbados Union Oil Co., Bridgetown	1,000				
Total	1,000				

AERIAL VIEW of Ohio Oil Co. of Guatemala's exploratory well, deep in Guatemala's interior at Chinaja. A gigantic airlift carried the rotary rig and supplies, totaling 4,000,000 lb., to an airstrip hacked out of the jungle near the well site.

ECUADOR

JERSEY STANDARD stepped into Ecuadorian oil operations this year when Esso Standard (Inter-America) took 19% interest in Anglo-Ecuadorian Oilfields, which produces about 80% of the country's 7,800-bbl.-daily crude production.

Esso acquired the interest from South American Gold & Platinum Co. The largest shareholder continues to be Lobitos Oilfields, with 35% interest. The remaining interest is held publicly.

Other crude production in the country is from properties held by Tennessee del Ecuador, S.A., and three local companies.

ECUADOR PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells—Flowing	No. of wells—Pumping	Production in bbl.—Daily avg. 1st 6 mos.	Production in bbl.—Cumulative	Gravity °API
Achallan, 1919	700-1,200	....	33	11	790,926	35
Ahuiguimi, 1922	300-1,000	....	5	7	187,075	34
Ancon, 1912	500-5,000	4	1,347	6,400	63,091,518	37-38
Carmela, 1953	1,700-3,800	....	4	11	52,242	34
Carolina, 1930	200-5,000	16	55	350	2,979,850	27-28
Cautivo, 1918	400-1,500	1	15	23	178,289	35
Concepcion, 1930	500-4,000	....	28	106	1,539,604	37-38
Petropolis, 1939	400-2,800	....	23	102	1,492,116	29-30
San Raimundo, 1928	300-1,500	....	18	31	310,853	35
Tigre, "deep," 1938	4,200	....	51	585	7,519,024	37
Tigre, "shallow," 1933	900-1,800	....	39	200	642,261	37
Total		21	1,618	7,826	78,783,758	

ECUADOR REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking—Thermal	Cracking—Catalytic	Reforming	Other processing
Anglo-Equadorian Oilfields, Ltd., La Libertad	11,500	6,000	.....	.....	10 L, 36 V
Santiago Petroleum Co., Cautivo	1,700	.....	.....	.....	.....
Total	13,200	6,000	.....	.....	

MEXICO

MEXICAN crude production rose above the 284,000-bbl.-daily level the second half of the year as the state agency, Pemex, continued to supply a demand that is rising at the rate of 8% per year. Because of transportation problems, some imports still are made. But these are limited to Lower California and the Ciudad Juarez area, south of the Texas border.

Pemex is steadily improving its transportation system, and a 600-mile 24-in. gas pipeline from Tehuantepec to Mexico City is expected to start moving gas by the end of the year. A new 214-mile 10¾-in. products pipeline from Monterrey to Gomez Palacio, in the State of Durango, opend late this year. It parallels a gas line to the same area.

A $200-million 1,200-mile 34-in. pipeline system from Texas to California through Mexico was proposed this year. The principals include Pemex, Tennessee Gas Transmission Co., and Southern California Edison Co. Heavy opposition from competitive supplies is expected when approval is sought from FPC. But if the system is built, Pemex will be an important gas supplier.

Pemex is investing heavily in petrochemical facilities. Its plans include a 20,000-ton per year tetraethyl lead plant and a 40,000-ton per year synthetic-rubber plant to be built in joint ventures with Argentina and Brazil. The projects are tied in with Mexico's participation of a new common-market group of Latin American countries seeking joint action in oil and other industries.

MEXICO PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells—Flowing	No. of wells—Pumping	Production in bbl.—Daily avg. 1st 6 mos.	Production in bbl.—Cumulative	Gravity °API
NORTHERN ZONE						
Northeastern District						
Berrendo, 1955	4,117	....	....	.....	2,428	48
18 de Marzo, 1956	7,120	....	....	.....	4,598	36
Francisco Cano, 1949	5,420	5	....	415	2,237,949	48
Lomitas, 1954	4,839	....	....	47	32,309	42
Mision, 1955	7,717	10	....	633	287,145	46
Monterrey, 1950	5,781	1	....	107	708,567	47
Reynosa, 1948	4,613	1	....	142	2,952,078	63
Rio Bravo, 1953	4,377	....	....	.....	8,429	47

WORLD WIDE OIL

MEXICO PRODUCTION (Continued)

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Trevino, 1950	5,797	18	7	1,561	5,781,600	37
Zacate, 1948	2,021	....	....	.....	182	..
Total Northeastern District		35	7	2,905	12,015,285	
Northern District						
Barcodon, 1959	4,680	10	....	1,350	249,202	17
Constituciones, 1956	6,247	61	8	9,860	6,554,140	19
Ebano-Panuco-Cacalilao, 1901	1,150	331	96	12,036	881,787,906	12
Empacadora, 1959	6,324	....	....	.....	81	..
Tamaulipas, 1956	4,190	59	5	6,818	6,404,367	..
Total Northern District		461	109	30,064	894,995,696	
Southern District						
Cabo Rojo, 1953	3,936	....	....	.....	88,355	22
Moralillo, 1948	4,592	19	2	865	9,256,084	12
Naranjo-Cerro Azul (Golden Lane), 1908	2,200	177	5	11,118	1,143,165,410	20
Solis, 1952	2,132	22	....	1,083	5,624,333	20
Tierra Amarilla, 1960	2,454	9	....	42	7,680	..
Tres Hermanos, 1959	7,007	6	....	1,317	291,295	21
Others	2,132	....	....	24	1,532,877	..
Total Southern District		233	7	14,449	1,159,966,034	
Poza Rica District						
Allende, 1955	7,470	....	....	.....	19,342	27
Avila Camacho, 1952	5,189	1	....	18	161,688	35
Cabellal, 1960	10,075	....	....	.....	.....	18
Cerro del Carbon, 1960	9,396	....	....	.....	.....	28
Chote, 1955	7,704	....	....	.....	42,811	24
El Haliazgo, 1957	10,155	47	....	15,704	9,899,821	25
Gran Morelos, 1957	9,880	2	....	636	2,088,924	27
Guerrero, 1955	6,578	1	....	260	3,922,528	26
Gutierrez Zamora, 1958	6,414	2	....	106	407,434	17
Hidalgo, 1954	7,720	4	....	842	5,541,022	31
Independencia, 1957	9,293	....	....	.....	5,585	31
Jiliapa, 1958	7,349	20	5	4,313	2,271,659	34
Macarena, 1955	10,332	1	....	29	53,385	22
Nuevo Progreso, 1955	7,177	7	3	974	3,024,349	31
Poza Rica, 1930	6,900	70	230	72,479	774,398,600	35
San Andres, 1956	10,286	89	1	28,841	41,053,016	29
Tajin, 1954	7,950	....	1	30	200,256	34
Tecolutla, 1956	7,556	1	....	101	304,603	31
Others	....	....	....	.....	3,031,084	..
Total Poza Rica District		245	240	124,333	846,426,107	
NEW GOLDEN LANE						
Acuatempa, 1955	4,019	19	....	3,182	9,261,610	21
Boca de Lima, 1956	5,702	....	....	.....	198,266	16
Caristay, 1957	4,885	....	....	.....	.....	23
Chichimantla, 1955	3,987	7	....	1,428	806,998	21
Copal, 1957	4,595	....	....	.....	25	15
E. Ordonez, 1952	4,723	15	....	4,895	37,030,645	21
Horcon, 1952	2,804	4	....	508	1,489,505	20
Las Canas, 1956	2,795	....	....	.....	1,717	23
Miquetla, 1959	6,492	2	....	58	10,536	35
Mesa Cerrada, 1956	3,934	11	....	327	2,118,260	22
Mozutla, 1953	4,000	4	....	583	6,657,858	18
Nueva Colonia, 1956	2,936	....	....	36	114,501	17
Ocotepec, 1953	3,395	6	....	1,537	7,939,888	20
Sta. Agueda, 1953	4,495	44	....	11,197	52,594,422	16
Tihuatlan, 1957	3,063	1	....	108	144,750	22
Xacotla, 1953	3,294	5	....	124	163,503	15
Total New Golden Lane		118	....	23,983	118,532,484	
CENTRAL ZONE						
Vera Cruz District						
Angostura, 1953	3,600	8	3	2,904	16,593,417	15
Casa Blanca, 1953	2,220	1	....	2	6,520	40
Tres Higueras, 1955	1,782	1	....	69	139,787	34
Total Vera Cruz District		10	3	2,975	16,739,734	

MEXICO PRODUCTION (Continued)

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
SOUTHERN ZONE						
Isthmus of Tehuantepec						
Acalapa, 1953	2,051		3	438	2,304,092	30
Agata, 1956	3,199	16	6	2,135	2,802,299	34
Arroyo Blanco, 1952	2,180	7	8	608	2,029,992	30
Cerro Nanchital, 1960	3,344	1	....	5	887	37
Concepcion, 1909	2,130	....	....	.....	57,099	41
Cuichapa, 1934	2,100		12	800	6,354,330	30
El Burro, 1930	2,460	5	42	1,357	23,179,983	26
El Plan, 1931	1,970	28	117	8,475	111,244,169	30
Filisola, 1921	1,585		36	635	24,486,346	22
Ixhuatlan, 1911	1,017		74	463	1,687,891	21
Los Soldados, 1953	4,480	7		915	441,132	32
Moloacan, 1948	1,370		14	164	1,051,179	
Nuevo Teapa, 1928	429		17	164	822,354	36
Rabon Grande, 1951	2,296	1	19	960	5,392,623	36
Santa Rosa, 1959	1,037	6		306	55,622	36
Taculilapa, 1955	2,920	4	2	349	656,992	36
Tonala, 1928	1,640		67	1,725	55,288,922	28
Others	....	....	....	.....	357,014	..
Total Tehuantepec		75	417	19,499	238,212,926	
Tabasco						
Fortuna Nacional, 1949	5,330	1	1	43	303,713	53
Jose Colomo, 1951	5,230	1	9	376	3,897,668	46
La Central	2,852	1			69	13
La Venta, 1954	4,698	72	27	10,415	15,479,938	41
Magallanes, 1957	3,829	34		6,463	2,849,508	27
Mecoacan, 1958	6,201	2		404	146,992	24
Ogarrio, 1957	5,722	104		24,081	11,872,338	38
Samaria, 1960	2,640					
Santa Ana, 1959	9,520	4		725	135,543	39
Tupilco, 1959	9,687				1,295	27
Vernet, 1928	3,465	7	1	458	839,809	48
Yucateco, 1960	6,867				69	35
Others	....	....	....	.....	835	..
Total Tobasco		226	38	42,965	35,527,777	
Total Mexico		1,403	821	261,173	3,322,410,043	

MEXICO REFINING

(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Pemex:					
Arbol Grande—Arbol Grande	26,000	.....	.....	.....	2,000 A
18 de Marzo—Atzcapotzalco	100,000	25,000 Vis.	26,000 FCC	.....	55,000 V, 32,000 PD, 3,400 Alky, 500 Is, 1,000 Poly
Ing. Antonio M. Amor—Salamanca	[1]40,000	5,000	.....	.....	9,000 PD, 2,800 L, 800 A
Madero—Madero	125,000	.....	26,000 FCC	.....	73,000 V, 11,500 PD, 3,200 A
Mata Redonda—Villa Cuauhtemoc	[2]	.....	.....	.....	.....
Minatitlan—Minatitlan	[4]85,000	.....	12,000 TCC	.....	24,000 V, 1,400 Poly, 800 L
Poza Rica—Poza Rica de Hidalgo	[3]7,000	.....	.....	.....	.....
Reynosa—Reynosa	10,000	2,000	.....	.....	.....
Total	393,000	32,000	64,000	.....	

(1) Additional 40,000-bbl. crude unit under construction. Also plan 30,000-bbl. vacuum unit and 20,000-bbl. Thermofor cat cracker. (2) 14,000-bbl. refinery shut down March 1960. (3) 15,000-bbl. crude unit under construction, plus 5,000-bbl. Perco desulfurizer. Present plant has 90,000-bbl. crude stabilizer. (4) 50,000-bbl. crude unit under construction, plus 30,000-bbl. Platformer. Planned additions include 20,000-bbl. thermal cracker, 10,000-bbl. vacuum capacity, and 9,500-bbl. TCC unit.

PERU

INTERNATIONAL PETROLEUM Co. faces nationalization of its Peruvian producing properties, and after a hot debate within the government this year it appears that a milder form of takeover will be followed.

Prime Minister Pedro G. Beltran won a 74-33 confidence vote over his program to nationalize International Petroleum's properties on a gradual basis. The company produces more than 90% of the country's

WORLD WIDE OIL

crude. It has been under criticism because it operates its La Brea y Parinas producing area as private property. Lobitos fields, owned 50-50 by International and Lobitos Oilfields, Ltd., also are involved.

The prime minister's plan is to put the producing operations on a 30-year concession basis, and give the government the big share of a 60-40 profit split. A minority faction wanted to virtually confiscate International's properties, including Talara refinery, and levy a heavy retroactive tax.

The world's first underwater completion has been carried off on an offshore well drilled by Peruvian Pacific, a subsidiary of Cities Service and Richfield Oil. The well, Humboldt 3, produces 200 bbl. daily through a special wellhead 132 ft. below the surface.

Belco Petroleum, New York, is successfully drilling deviated wells into the Pacific Ocean off northern Peru. One well, Litoral 4-2, tested 1,100 bbl. daily this year.

A $15-million, 12,000-bbl. refinery is planned in the Lima area by local and U. S. interests. California Standard has 35% interest in the new company, Refineria Conchan California, S.A.

PERU PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells		Production in bbl.		Gravity °API
		Flowing	Pumping	Daily avg. 1st 6 mos.	Cumulative	
Agua Caliente, 1937	900-1,100	....	14	2,370	5,083,712	44.0
Goyonitas-Peru, 1953	3,500-6,000	7	7	706	554,651	33.5
La Brea-Parinas, 1888	3,000	173	1,536	22,764	419,632,206	36.0
Lima Concessions, 1901	3,000	99	775	22,642	131,544,010	38.4
Litoral, 1959	3,200	3	....	220	.....	42-48
Maquia, 1957	2,137-2,162	10	....	750	205,000	38.0
Mirador, 1955	4,500	15	....	235	.....	38.0
Patria Concession, 1943	2,000-5,000	18	118	1,992	6,343,843	40.0
Punta Bravo, 1956	.....	2	9	187	152,655	36.4
Sector Tunal, 1955	.....	.....	2	65	28,903	22.5
Zorritos-Cope, 1863	800-2,000	.....	17	19	3,686,486	28.6-36.7
Total		327	2,478	51,950	567,231,466	

*Includes gas lift.

PERU REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking		Reforming	Other processing
		Thermal	Catalytic		
Cia. de Petroleo Ganzo Azul, Ltd., Pucallpa	600	.....	.....	.....	.....
Empresa Petrolera Fiscal, Iquitos	1,000	.....	.....	.....	.....
International Pet. Co., Ltd., Talara	47,000	3,600 4,200 Vis	.....	.....	1,000 L, 1,640 A
Total	48,600	7,800	.....	.....	

TRINIDAD

TRINIDAD crude production inched steadily above the 121,000-bbl.-daily level this year except for a sharp cutback to 68,500 bbl. daily in July during a strike.

The industry continues to be characterized by intense onshore and offshore development by a number of companies. British Petroleum increased its interest in the island's industry by acquiring Apex (Trinidad) Oilfields, Ltd., in a stock and cash exchange deal. The move gave BP an additional 12,500-bbl.-daily production in Trinidad. The company also holds one-third interest in Trinidad Northern Areas and 77% interest in Trinidad Petroleum Development Co.

TRINIDAD PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells		Production in bbl.		Gravity °API
		Flowing	Pumping	Daily avg. 1st 6 mos.	Cumulative	
Balata-Bovallius, 1952	7,200-9,426	.....	.....	425	.....	29-35
Brighton-Vessigny and Adjacent Marine Area, 1908	700-7,500	.....	.....	8,334	.....	16-38
Catshill, 1953	1,400-9,095	.....	.....	3,518	.....	29-46
Forest Reserve-Apex-San Franique-Pt. Fortin East, 1913	1,000-16,115	.....	.....	33,432	.....	15-33
Guayaquayare, 1902	500-7,919	.....	.....	5,091	.....	15-49
Innis/Trinity, 1956	5,127	.....	.....	5,069	.....	33
Kern-Parrylands-Cruse, 1913	2,000-10,626	.....	.....	5,116	.....	13-30
Moruga, East, 1953	9,693	.....	.....	372	.....	11-40
Moruga West, 1957	8,604	.....	.....	3,431	.....	30
Oropouche, 1954	2,000-9,077	.....	.....	544	.....	35
Palo Seco-Los Bajos, 1926	460-12,718	.....	.....	14,733	.....	16-33
Penal-Barrackpore, 1918	1,300-11,067	.....	.....	9,711	.....	11-35
Point Fortin-Point Ligoure, 1908	1,000-10,800	.....	.....	3,932	.....	15-45

TRINIDAD PRODUCTION (Continued)

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Quarry-Coora-Quinam-Morne Diablo, 1936	280-14,018	.....	.....	7,974	.....	16-30
Soldado Marine, 1955	9,010	.....	.....	15,774	.....	17-35
South Domoil, 1959	11,000	.....	.....	681	.....	47
Total Trinidad		983	[1]2,231	118,137	[2]669,000,000	

(1) Includes gas/air lift, plunger, etc. (2) Estimated.

TRINIDAD REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking Thermal	Cracking Catalytic	Reforming	Other processing
Brighton Terminal, Ltd., Brighton	5,000	.....	.....	.....	.....
Shell Trinidad, Ltd., Point Fortin	[1]55,000	.....	.....	.....	10,000 V, 4,000 A
Texaco Trinidad, Inc., Pointe-a-Pierre	235,000	25,000 Vis.	28,000 FCC	15,000 Pf 9,000 Rex	60,000 V, 23,500 Un, 2,500 Alky, 1,400 Poly
Total	295,000	25,000	28,000	24,000	

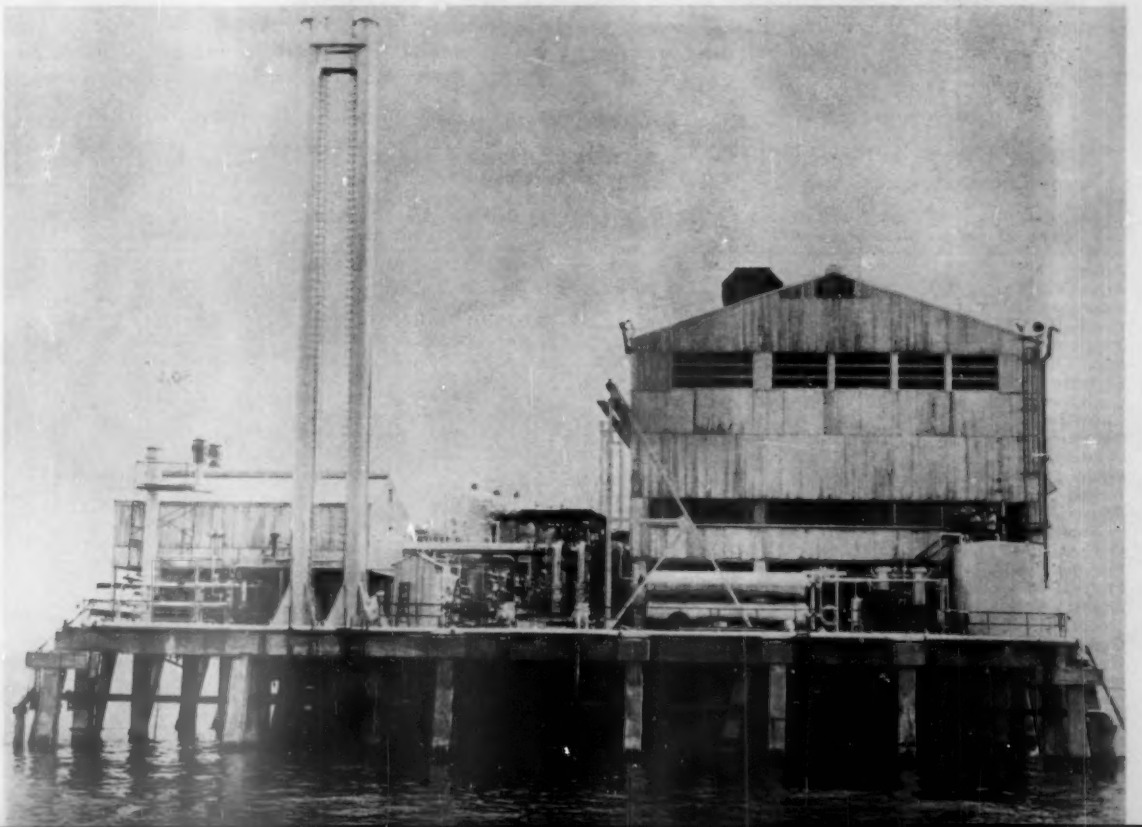
(1) Plan to add 10,000-bbl. crude capacity.

VENEZUELA

VENEZUELA is rounding out its second year under the oil policies of Oil Minister Juan Perez Alfonzo, and opinion is sharply divided on where the industry now stands and where it is headed.

Dr. Perez Alfonzo insists the oil industry is in good shape. Production is up slightly from last year, oil revenues are holding up, and discounts off posted prices on crude sales are being cut back to a maximum of 5% by December 31. He states that this policy is preferable to expanding exports at lower prices. He hopes to see his views evolve into a world-wide prorationing scheme adhered to voluntarily by the major oil-exporting countries. He was instrumental in setting up the Organization of Petroleum Exporting Countries (OPEC) at Baghdad this year, and he is expected to push his plans when the group meets in Caracas in

BUILT OVER LAKE WATERS of Venezuela's Lake Maracaibo, this plant injects 300,000 M.c.f. of gas daily into oil-rich reservoirs beneath lake waters. It is the second such plant to be built over the lake by Creole Petroleum Corp.



January. Member countries besides Venezuela are Iran, Iraq, Kuwait, and Saudi Arabia.

In contrast, many oil men and Venezuelan business leaders believe the industry is stagnating. Since the income-tax laws were revised to give the government the large half of a 60-40 profit split, which in practice is even greater, capital expenditures by the industry have been cut to the bone. Drilling is about half of what it was a year ago, and companies continue to turn back unpromising acreage. The lack of industry spending has not only been a factor in a general listlessness in the whole Venezuelan economy; it means that if and when existing excess productive capacity is soaked up by rising world-wide demand, the country's position as a supplier will erode further. Many observers doubt that Middle East producing countries, which are enjoying soaring production, will agree to a prorationing scheme. Venezuelan output of 2,810,700 bbl. daily the first 10 months was up only 3.7% over the same period a year ago, less than the 4% annual gain Dr. Perez Alfonzo called for.

Signs of political instability also are evident. The government late in the year put down revolutionary attempts by both pro-Castro and militarist groups, and troops guarded oil installations.

Most of the gains have been registered by newcomers to Venezuela. These companies, however, for the most part face the problem of limited markets in the U. S. because of import restrictions, and tough sales problems in Europe where they run head-on into Middle East oil. The two giants, both of which have access to established European markets, registered a decline the first 10 months. Creole Petroleum in the period averaged 1,057,000 bbl. daily, off 0.8%, and Cia. Shell de Venezuela, with 767,800 bbl. daily, was down 7.8%.

Other established companies did relatively better. Mene Grande averaged 399,700 bbl. daily, up 10.4%; Mobil, 107,400 bbl. daily, up 8.2%; Texaco, 56,600 bbl. daily, up 2.2%; Richmond, 59,700 bbl. daily, up 24.7%; and Sinclair, 53,300 bbl. daily, up 6.8%.

The newcomers, on the whole, did best. San Jacinto averaged 36,000 bbl. daily, up 20.3% on production where it is operator; Phillips, 49,200 bbl. daily, up 124.6%; Venezuelan Atlantic, 29,000 bbl. daily, up 5.8%; Signal, 24,300 bbl. daily; up 7.8%; and Superior, 60,800 bbl. daily, up 155.5%. Continental produced only token amounts of oil, and Pan Venezuelan not any.

Among the smaller, long-established firms, Mercedes averaged 16,200 bbl. daily, off 47.8%; Talon, 1,100 bbl. daily, off 15.4%; Caracas, 8,700 bbl. daily, up from 100 bbl. daily last year; and Coro, 8,400 bbl. daily, up 1.2%.

The new national oil company was inaugurated in April, and was granted choice semiproved acreage, mostly in Lake Maracaibo. But the company is hampered by a lack of qualified personnel and capital, and little, if any solid progress had been made by the end of the year.

There was little doubt, however, that Venezuela still is one of the world's greatest oil sources. Venezuelan Sun completed a well on Block 1 in Lake Maracaibo with 1,797 ft. of productive oil sand, which the ministry of mines said is the thickest ever found in the country. The well tests 7,500 bbl. daily of 30°-gravity oil through a ¾-in. choke.

In eastern Venezuela, exploration was highlighted by Pato 2 in Freites District of Anzoategui. Mene Grande took the test to 16,411 ft., the deepest in eastern Venezuela. The well tests 445 bbl. daily of 38°-gravity crude with a 9% water cut in the L3 sand.

VENEZUELA PRODUCTION

EASTERN VENEZUELA
State of Anzoategui

Name of field—Discovery date—	Depth (ft.)	Production in bbl. Daily avg. 1st 3 mos.	Production in bbl. Cumulative	Gravity °API
Aguasay	.....	798	72,592	.....
Aguasay Zeta	.....	1,705	1,054,921	.....
Apamate, 1951	6,670	25	455,552	43.1
Araibel, 1954	8,970-10,516	2,963	10,137,314	34.2-35.1
Aragua, 1950	7,519- 8,822	949	5,943,530	54.8
Boca, 1951	9,500	9,385	35,439,804	32.0-34.8
Bucaral, 1958	.....	642	350,222	40.5
Cachama Norte, 1952	7,724	45	717,329	31.0
Caico Seco, 1946	6,500- 7,300	4,343	17,345,709	37.1-41.1
Cantaura, 1951	11,962	4	52,640	43.5
Chimire, 1948	7,000- 7,200	41,991	173,208,954	36.1-36.5
Dacion, 1951	6,700	34,162	82,740,352	21.6
Dakoa, 1951	3,500- 5,700	227	349,172	14.4
Elias, 1957	5,100- 5,300	1,128	1,051,147	36.1
El Roble, 1939	8,044-11,560	1,913	31,218,574	44.3-47.5
El Toco, 1948	9,000	2,262	14,645,174	40.5
Esquina, 1951	4,360	443	2,036,542	30.1
Fria, 1948	6,500- 7,300	4,562	9,381,796	37.5
Guara, 1942	5,000-10,000	47,051	315,811,721	26.0-33.4
Guario, 1940	5,000-10,000	3,567	35,406,513	44.8
Guere, 1951	7,800	1,910	19,964,099	37.5
Guico, 1944	4,500- 7,000	8,791	54,769,937	29.1-32.0
Inca, 1948	7,100	1,524	1,319,837	39.0
Isla, 1954	5,470	241	678,339	43.6

We're Breaking Murphy's Law

When men first tried putting satellites into orbit, they thought they had learned a rule of rocketry: if a component *can* fail, it *will* fail. They called it "Murphy's Law", and, as headlines tell us, the law is frequently enforced.

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EASTERN VENEZUELA PRODUCTION (Continued)

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Juanita, 1956			4,000	607	527,215	34.5
Junta, 1954			6,720	4,456	7,481,786	23.9
La Ceibita, 1953		9,871-	9,878	9,234	8,978,959	38.7
Largo				31	2,786	
La Vieja, 1951			2,750	290	2,569,870	24.8
Leona, 1938		2,268-	12,085	19,012	54,442,355	24.5-29.0
Luna, 1957			5,720	214	280,642	12.4
Mapiri Este, 1949			9,500	5,451	23,682,246	32.0-33.4
Mata, 1951			11,520	59,973	78,513,196	30.4-35.2
Merey, 1937			5,700	33,027	23,540,033	9.7-15.0
Nipa, 1945		6,000-	8,500	63,758	226,756,398	31.7-32.9
Oficina, 1937			5,900	69,160	373,358,385	21.2-26.2
Oscurote, 1953			9,513	16,606	38,438,553	31.2
Pelayo, 1947			6,650	23	548,050	23.9
Pradera, 1951			6,430	1,793	3,393,407	28.7
Quiamare, 1942		5,900-	6,650	1,857	8,961,630	42.2
Rosa, 1958			11,412	358	482,173	37.5
San Joaquin, 1939			6,560	4,888	60,641,301	46.7
San Roque, 1949			8,500	939	11,456,346	51.7
Santa Ana, 1939			8,500	11,305	45,815269	37.9
Santa Rosa, 1941			8,500	47,588	97,408,511	44.6
Socororo				495	85,613	
Soto, 1949			9,500	21,629	87,578,773	35.3
Tacata, 1946			2,200	107	437,922	37.2
Tapuco, 1952		10,000-	10,170	2,645	13,994,471	32.4
Yopales, 1937			4,600	8,600	22,799,682	22.8
Zacarias				581	52,836	
Zanjas				2,125	662,733	
Zapatos, 1935				14,022	6,349,316	35.2
Zeta, 1954			10,700		59,790,273	31.8
Zorro, 1953				7,814	2,790,495	27.8
Zuius, 1957				3,621	1,214,256	35.9
Zumo, 1954				8,770	2,971,325	28.7
Zumo Norte, 1955				1,380	725,362	30.0
Others, not currently producing					10,976,734	
Total Anzoategui				592,990	2,091,860,672	
Federal Territory of Amacuro						
Pedernales, 1933			1,571	6,874	49,042,642	21.1
Rosa, 1958			1,250		25,291	18.7
Tucupita, 1945			5,606	4,943	33,872,436	16.6
Others, not currently producing					23,656	
Total Amacuro				11,817	82,964,025	
State of Guarico						
Belen, 1954			4,648	10	361,506	50.0
Bella Vista, 1952		2,962-	4,637	1,814	7,326,470	23.6
Les Mercedes, 1942		4,160-	4,500	17,349	92,536,744	31.8
Punzon, 1946			4,400	189	744,041	32.6
Rositas, 1958				247	44,848	
Ruiz, 1949			4,450	3,071	23,447,151	31.3
Saban, 1947			2,600	1,913	13,873,367	36.9
Taman, 1949			5,200	895	10,554,594	38.5
Tucupido, 1947		2,800-	5,600	1,620	14,300,316	38.5
Others, not currently producing					14,618,112	
Total Guarico				27,108	177,807,149	
State of Monagas						
Aguasay, 1955		8,100-	13,400	8,732	11,813,989	32.9-39.4
Jusepin, 1938		3,000-	5,300	7,326	175,115,433	32.9
Manresa, 1954		2,524-	2,615	94	962,688	16.7
Mata Grande, 1946			4,700	1,112	7,384,486	25.1
Mulata, 1941		3,500-	6,600	3,415	87,918,310	37.4
Muri, 1942			4,500	479	15,323,152	26.2
Oritupano, 1954			7,675	17,594	14,200,146	12.0-21.3
Orocual					5,156,902	
Pilon, 1937		3,355-	3,600	14,710	4,653,474	14.1-15.2
Pirital, 1958		450-	1,100	1,796	975,475	18.5
Quiriquire, 1928		7,000-	7,200	50,631	564,914,499	16.2
Santa Barbara, 1941		5,000-	6,500	12,144	119,926,501	29.5-35.2
Tacat, 1953		1,830-	3,668	7,793	8,956,873	17.8
Temblador, 1936		3,500-	4,500	7,591	62,436,273	21.0-22.0
Travieso, 1944			4,000	114	1,504,319	25.7
Others, not currently producing					103,601	
Total Monagas				133,531	1,081,346,121	
Total Eastern Venezuela				765,446	3,433,979,967	

(Continued on page 152)

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WORLD WIDE OIL

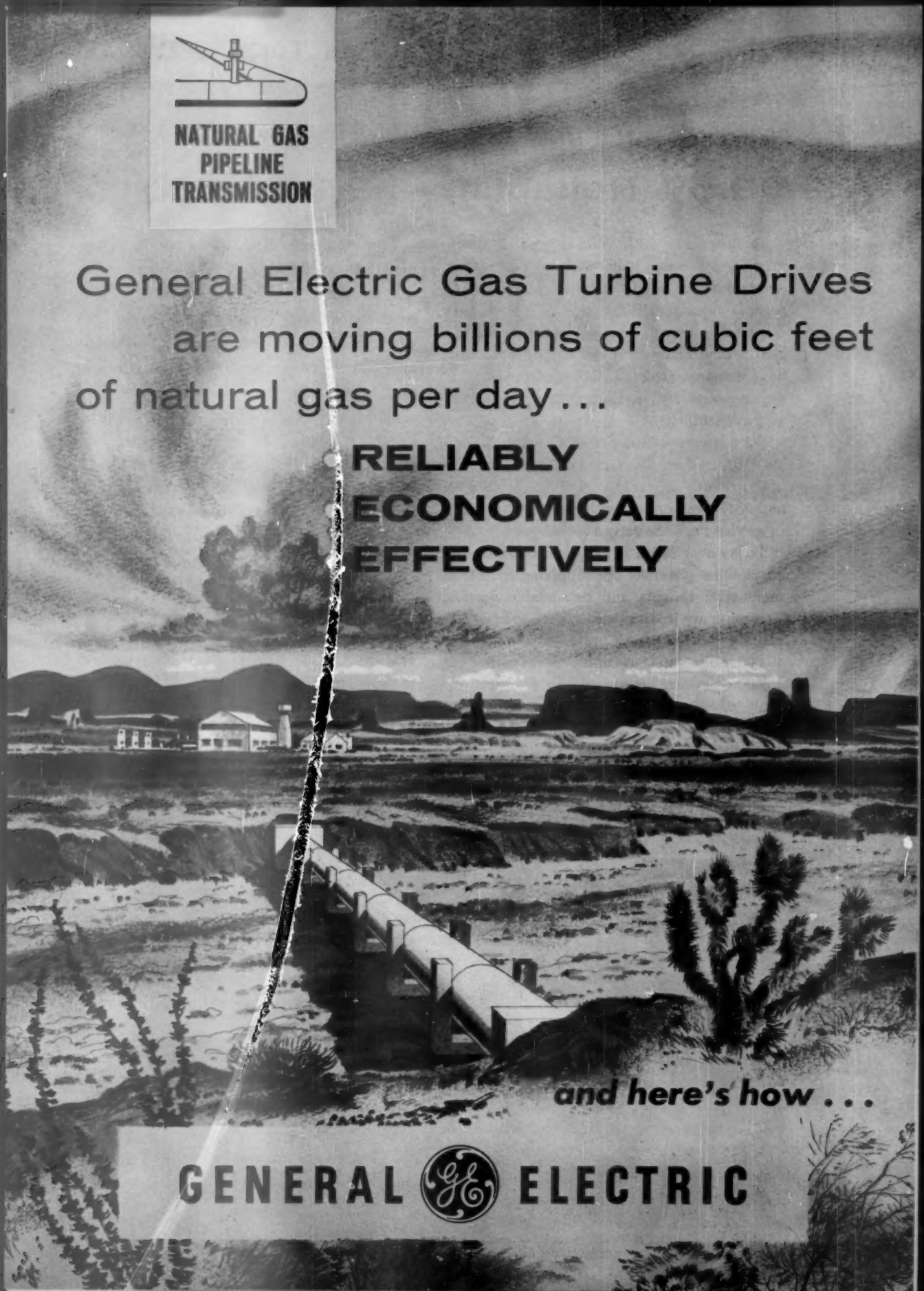
WESTERN VENEZUELA

Name of field—Discovery date—	Depth (ft.)	Production in bbl. Daily avg. 1st 3 mos.	Production in bbl. Cumulative	Gravity °API
State of Barinas				
Estero, 1957	10,700	32	307,131	29.2
Maporal, 1957	10,944	962	150,272	28.2
Palmita, 1957	10,792	30	191,581	26.0
Silvan, 1949	10,862	6,505	3,563,902	28.2
Silvestre, 1945	8,850	9,690	7,387,899	28.2
Sinco, 1953	8,500- 9,100	28,638	28,523,125	25.9
Total Barinas		45,857	40,123,910	
State of Trujillo				
Motatan, 1938	8,850	.....	3,093,198	
Total Trujillo		.....	3,093,198	
State of Falcon				
Cumarebo, 1913	1,968	1,554	54,699,757	47.4
Hombre Pintado, 1927	1,000	520	6,378,195	21.6
Mamon, 1926	3,350	.....	552,496	32.4
Mene Mauroa, 1921	600- 1,850	549	29,347,440	38.7
Tiguaje, 1953	3,328- 3,348	1,521	3,244,208	26.9
Total Falcon		4,144	94,222,096	
State of Zulia				
Bachaquero, 1930	3,444-11,500	742,718	1,359,209,237	14.0-37.6
Barua, 1958	10,500	1,028	780,794	18.1
Boscan, 1946	6,500- 7,500	61,467	169,058,621	10.3
Cabimas, 1917	2,200	50,824	986,424,763	19.6-25.3
Centro del Lago, 1958	.....	58	76,334	30.0
Ceuta, 1956	9,600-11,000	34,012	16,280,008	32.1
El Cubo, 1916	984	14,426	184,003,313	35.5
Ensenada, 1948	8,550	19	627,634	50.2
La Concepcion, 1935	3,148- 8,000	12,737	72,912,141	36.6
Lago Central	.....	1,320	206,041	.....
Lagunillas, 1926	3,000- 8,600	679,383	3,945,656,160	15.1-33.5
La Paz, 1925	4,264- 8,000	78,704	590,934,765	32.9
Mara, 1945	5,248	26,748	296,504,832	29.3-30.1
Mene Grande, 1914	3,050- 4,132	121,801	523,855,357	18.1-35.0
Sibucara, 1948	13,451	3,404	30,824,845	37.0
Tia Juana, 1928	3,000	174,854	1,395,045,535	14.0-25.7
Urdaneta, 1957	7,600- 8,000	42,142	20,646,815	10.9-26.9
Others, not currently producing	.....	.....	122,199	
Total Zulia		2,045,645	9,593,169,394	
Total Western Venezuela		2,095,646	9,730,608,598	
Total Venezuela		2,861,092	13,164,588,565	

VENEZUELA REFINING

(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Cia. Shell de Venezuela, Ltd.:					
Cardon	240,000	25,000	35,000 FCC	8,000 T	89,000 V, 2,500 Alky, 2,000 Poly, 3,000 L
San Lorenzo	45,000	.....	.....	.....	.....
Calvario	300	.....	.....	.....	.....
Casigua	1,000	.....	.....	.....	.....
La Riviera	300	.....	.....	.....	.....
Creole Petroleum Corp.:					
Amuay	345,500	.....	.....	11,100 Fhy	90,000 V, 17,000 Hyd, 778 L
Caripito	68,000	36,000 Vis	.....	.....	.....
Mobil Oil Co. de Venezuela:					
El Palito	50,000	.....	.....	6,000 CR	.....
Barinas	200	.....	.....	.....	.....
Petroquimica, Moron	3,000	.....	.....	350 Cat	.....
Phillips Petroleum Co., San Roque	3,500	.....	.....	.....	.....
Richmond Exploration Co., Bajo Grande	35,000	.....	.....	.....	7,000 A
Sinclair Oil & Refining Co., Puerto La Cruz	35,000	12,000 Vis	.....	.....	.....
Texas Petroleum Co., Tucupita	10,000	.....	.....	.....	.....
Venezuela Gulf Refining Co., Puerto La Cruz	125,000	14,500 Vis	8,650 FCC	12,000 CR	.....
Total	961,800	87,500	43,650	37,450	


NATURAL GAS
PIPELINE
TRANSMISSION
General Electric Gas Turbine Drives
are moving billions of cubic feet
of natural gas per day...
RELIABLY
ECONOMICALLY
EFFECTIVELY
and here's how...
GENERAL ELECTRIC

RELIABLE... General Electric Gas Turbine Drives

PROVEN ON THE LINE

99.5% Reliability—98% Availability

To keep pace with your expanding transmission systems, your station compressor drives must be highly reliable . . . and always ready for service. When selecting your next compressor drive, consider General Electric gas turbine drives. Proven on the line, they have demonstrated their ability to meet your requirements for maximum drive reliability and availability.

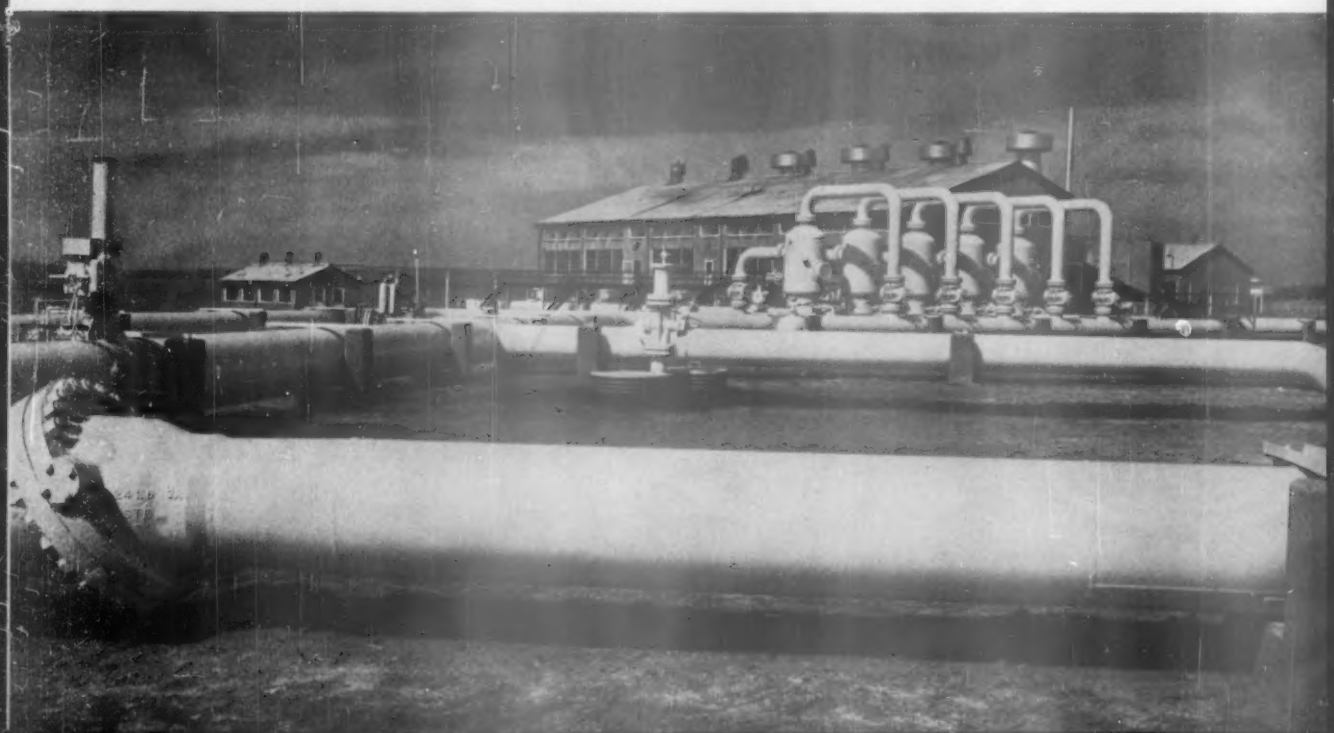
For example, a study of all General Electric gas turbines in high-use-factor service (50 units) reveals an average of 99.5% reliability, and 98% availability, with many having been in service since the early 1950's.

Today over 200 G-E gas turbine drives—87 on pipeline systems—are supplying industrial users with reliable and dependable service. Ten units are in service each with over 50,000 hours of operation; 35 units, each with over 40,000 hours and 64 units, each with over 30,000 operating hours.

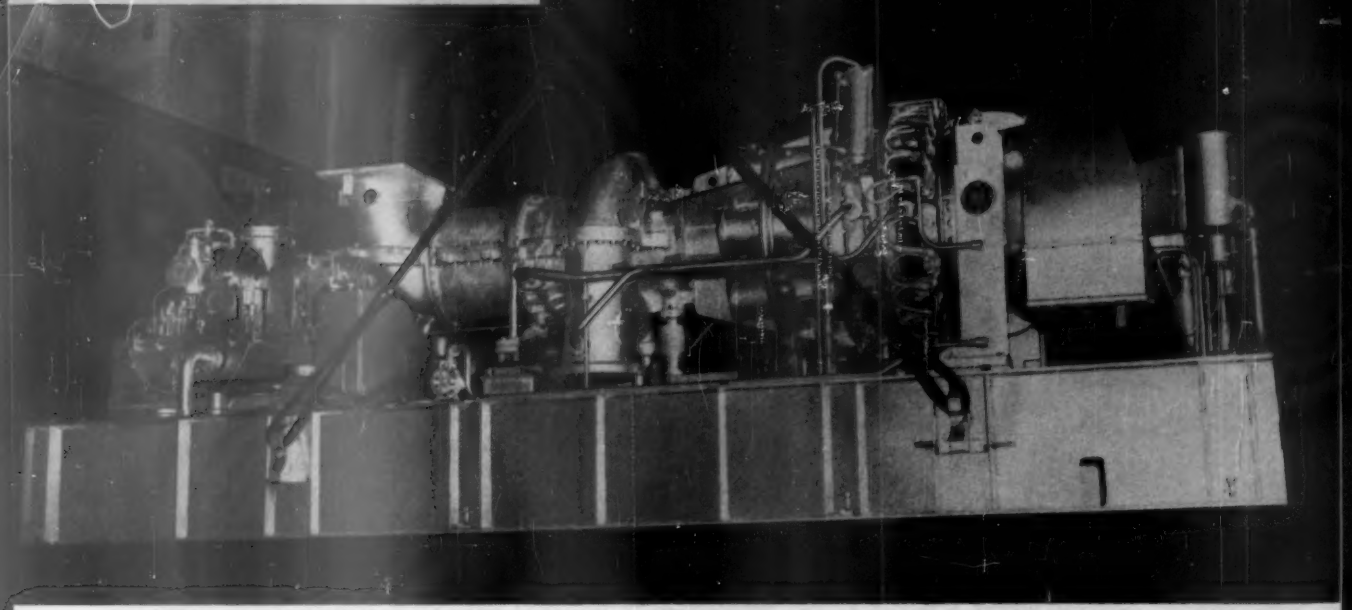
To further assure top performance, an unmatched General Electric service organization stands ready to assist you. Installation and service engineers, located in 89 cities, are available for prompt service, inspection assistance and emergency trouble shooting. In addition, pipeline service specialists can help you establish and set up a Productive Maintenance Program tailored to your equipment and schedules. Their knowledge of the latest technological developments and service techniques assure you of the best service available today. And, on call 24 hours a day, year 'round are 50 G-E Service Shops. These shops utilize the most modern repair techniques available, provide expert service in the shop or at your site.

For reliable compressor drives, specify General Electric gas turbine drives for your next pipeline station.

THE RECORD of the four gas turbine compressor drives in this pipeline station underscore the high reliability and availability characteristic of General Electric gas turbine drives.



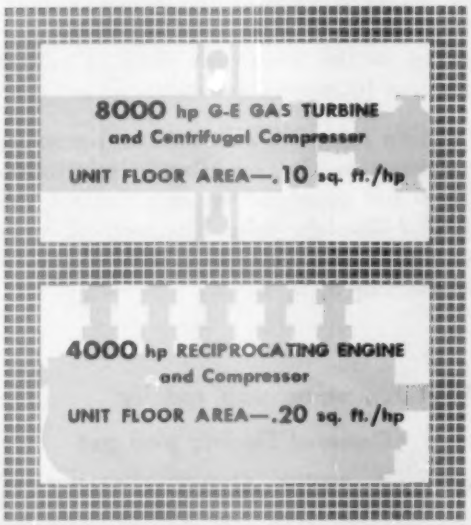
ECONOMICAL . . . General Electric Gas Turbine Drives



EASY TO INSTALL G-E gas turbine compressor drives are piped, wired and tested at the factory. Integral turbine-base becomes part of final station foundation.

PROVEN ON THE LINE

Lower Initial and Operating Costs


8000 hp G-E GAS TURBINE
and Centrifugal Compressor
UNIT FLOOR AREA—.10 sq. ft./hp
4000 hp RECIPROCATING ENGINE
and Compressor
UNIT FLOOR AREA—.20 sq. ft./hp

G-E GAS TURBINE and centrifugal compressor provide considerably more horsepower for the same floor space than other types of reciprocating engine drives. This means G-E gas turbine compressor stations can be smaller and less costly to construct than stations of equivalent reciprocating horsepower.

GENERAL ELECTRIC

In addition to inherent high drive reliability and availability, General Electric gas turbine drives offer you lower installed costs and competitive overall station operating costs.

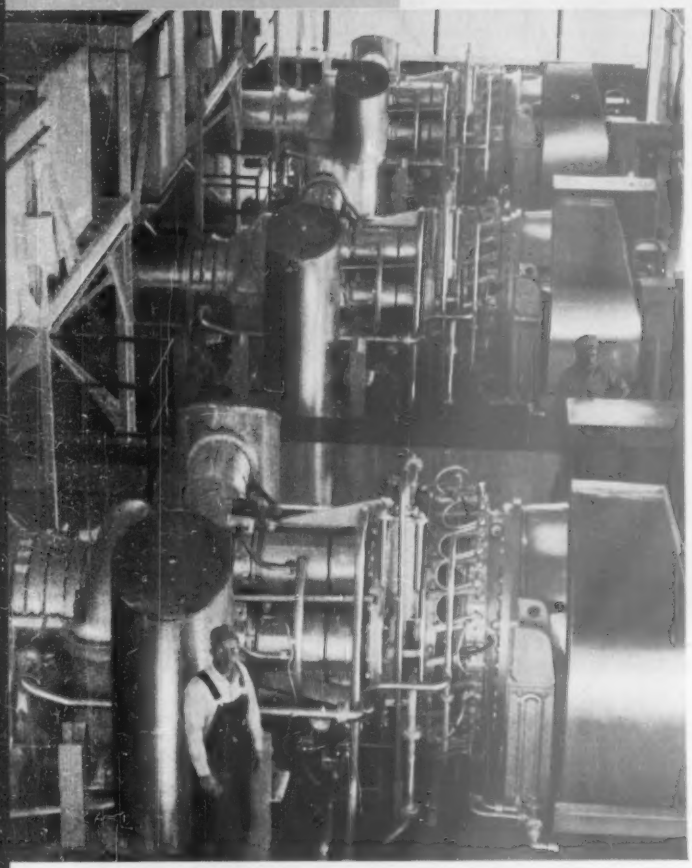
Compared with gas engine stations of equivalent horsepower, General Electric gas turbine stations require far less space. For example, a complete 8000 hp compressor station including gas turbine, compressor, controls, auxiliaries and station services requires a building measuring no more than 50 x 54 feet. This means your stations can be smaller and less costly to construct.

For faster, easier, more economical installations, units through 14,200 hp are shipped from the factory completely assembled and mounted on a structural steel base. This integral base—containing the piping, wiring, auxiliaries and lube-oil tank—becomes part of the permanent station foundation. Much of the heavy, costly foundations needed for other types of gas-fired drives are eliminated.

Still another benefit is reduced overall operating costs. Since General Electric gas turbine drives have no reciprocating parts, your maintenance program can be confined to periodic inspection with infrequent overhauls. Parts and labor costs thus can be reduced.

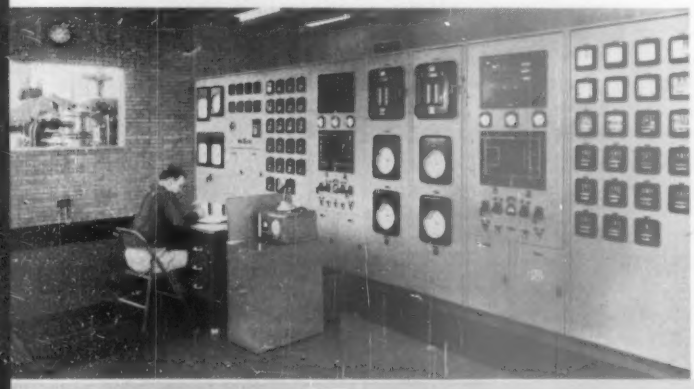
These are typical of the many savings offered you through the utilization of G-E gas turbine drives in your pipeline system. So for economical and profitable operation, specify General Electric.

EFFECTIVE... General Electric Gas Turbine Drives



G-E GAS TURBINE DRIVES meet varied operating requirements with efficient and economical shaft power for pipeline compressors.

COMPLETE STATION CONTROL is handled from combined process-turbine control panel. Supervisory personnel efficiently control entire operating sequence from one centralized panel.



PROVEN ON THE LINE

Up to 40% More Power During Winter Peak Loads

General Electric gas turbine drives are your answer to more effective station operation. For example, during winter operation at reduced ambient temperatures, G-E gas turbine compressor drives can deliver up to 40% more than rated horsepower. This output bonus will help you meet winter peaks more effectively.

To assure even greater operating effectiveness, a second stage, variable-angle nozzle is incorporated in G-E gas turbine drives. Controlled manually or automatically, this technological innovation permits adjustment for optimum performance at varying load and ambient conditions. Its action reduces starting power requirements; provides quicker control response; increases output and improves the thermal efficiency at off-design ambient temperature operation.

Still another significant feature is the centralized control panel. From this nerve-center, your G-E gas turbine compressor stations can be put on the line in less than 20 minutes locally or by remote operation.

For more information on reliable, economical and effective General Electric gas turbine drives and associated systems, contact your General Electric Sales Engineer, or write, Section 661-02, General Electric Company, Schenectady 5, N. Y.

AND . . . when you specify General Electric you get THESE ADDED VALUES . . .

QUALITY CONTROL
Quality control influences every G.E. operation, from order receipt to shipment.

PRODUCT INNOVATION
Product research and development is advanced in all 98 G.E. laboratories.

APPLICATION ENGINEERING
Customer-oriented application engineers assist you with systems integration.

ANALYTICAL ENGINEERING
The latest tools of process analysis are available for studies of your problems.

INSTALLATION AND SERVICE ENGINEERING
Expert on-site assistance gives you smoother installation and earlier start-up.

SYSTEM CO-ORDINATION
G.E.'s systems experience focuses the full Company capabilities on your order.

PROMPT DELIVERY
Accurate delivery cycles put your new G.E. equipment to work for you—on time.

VALUE ANALYSIS
Value Analysis gives you optimum combination of product value and economy.

GENERAL ELECTRIC

30. How to find average reservoir pressure

- by arithmetic weighting
- by thickness weighting
- by area weighting
- by volume weighting

BY E. T. GUERRERO
and
F. M. STEWART

GIVEN: Pressure survey results for a reservoir having 27 producing wells. Columns 2 and 3 of Table 1 show the net sand thickness at each well and pressures measured. Columns 4 and 5 of the same table show the estimated drainage area of each well and the average net sand thickness in each drainage area.

REQUIRED: Draw an isobaric map with the measured pressures and compute the average reservoir pressure by weighting arithmetically, by thickness, by area, and volumetrically.

METHOD OF SOLUTION: The summation equations below may be used for the method shown.

Arithmetic weighting—

$$p_{avg} = \sum_{i=1}^{i=n} p'_i/n \qquad (1)$$

Thickness weighting—

$$p_{avg} = \sum_{i=1}^{i=n} h_i p_i / \sum_{i=1}^{i=n} h_i \qquad (2)$$

Area weighting—

$$p_{avg} = \sum_{i=1}^{i=n} A_i p_i / \sum_{i=1}^{i=n} A_i \qquad (3)$$

Volume weighting—

$$p_{avg} = \sum_{i=1}^{i=n} A_i h_i p_i / \sum_{i=1}^{i=n} A_i h_i \qquad (4)$$

Where:

p_{avg} = average reservoir pressure, psi.

p'_i = measured pressure for well i, psi.

p_i = average pressure in drainage area of well i, psi.

n = number of pressures involved.

h_i = net sand thickness at well i, ft.

A_i = drainage area of well i, acres.

SOLUTION:

Arithmetic weighted—

Using the summation of column 3 in Table 1:

$$p_{avg} = 22{,}961/15 = 1{,}531 \text{ psi.}$$

Thickness weighted—

Using the summation of columns 8 and 5 of Table 1:

$$p_{avg} = 687{,}265/450 = 1{,}527 \text{ psi.}$$

Area weighted—

Using the summations of columns 10 and 4 of Table 1:

$$p_{avg} = 1{,}771{,}410/1{,}147 = 1{,}544 \text{ psi.}$$

Using the summation of column 5 of Table 2 and a total area of 1,140 acres:

$$p_{avg} = 1{,}763{,}755/1{,}140 = 1{,}547 \text{ psi.}$$

Volume weighted—

Using the summations of columns 9 and 7 of Table 1:

$$p_{avg} = 29{,}259{,}390/19{,}078$$

$$= 1{,}534 \text{ psi.}$$

DISCUSSION: There is possibly no factor used more in reservoir engi-

TABLE 2—AVERAGE PRESSURE FROM ISOBARIC MAP DATA

(1) Isobar	(2) Area inclosed by isobar, acres	(3) Area between isobars, acres	(4) Avg. pressure in area, psi.	(5) (Area)×(Pressure) (3)×(4)
1,380	0	0	....	.....
1,400	67	67	1,390	93,130
1,450	230	163	1,425	232,275
1,500	422	192	1,475	283,200
1,550	608	186	1,525	283,650
1,600	764	156	1,575	245,700
1,650	868	104	1,625	169,000
1,700	1,100	232	1,675	388,600
1,710	1,140	40	1,705	68,200
				1,763,755

TABLE 1—BASIC DATA AND CALCULATIONS FOR AVERAGE PRESSURE

(1) Well	(2) Net sand thickness at well, ft.	(3) Static press. measured, corrected to datum, psi.	(4) Estimated area drained by well, acres	(5) Avg. net sand thickness in drainage area, ft.	(6) Avg. pressure in drainage area, psi.	(7) (Thickness)×(Area) (5)×(4)	(8) (Thickness)×(Pressure) (5)×(6)	(9) (Volume)×(Pressure) (7)×(6)	(10) (Area)×(Pressure) (4)×(6)
1	4	1,600	40	5	1,590	200	7,950	318,000	63,600
2	11	....	40	10	1,530	400	15,300	612,000	61,200
3	9	1,520	40	10	1,520	400	15,200	608,000	60,800
4	9	....	40	7	1,540	280	10,780	431,200	61,600
5	8	1,621	54	8	1,640	432	13,120	708,480	88,560
24	12	....	52	14	1,650	728	23,100	1,201,200	85,800
25	14	1,650	46	15	1,645	690	24,675	1,135,050	75,670
26	12	....	47	12	1,640	564	19,680	924,960	77,080
27	12	1,660	51	14	1,650	714	23,100	1,178,100	84,150
		22,961	1,147	450		19,078	687,265	29,259,390	1,771,410

Most Anyone Can Put Holes In A Pipe

Some oil men think that completing a well means nothing more than putting holes in a pipe. Most anybody can do that.

But Welex Completion Services offer more than holes in the pipe. That's why selection of Welex to complete your well is so important.

Welex's well-rounded Completion Services go far beyond "just putting holes in pipe." To you, this may mean the difference between winning and losing a million dollar gamble a mile or two or more underground.

Why is Welex the best choice? There are many reasons. For example:

What if the well presents special completion problems—problems such as high temperatures or high pressures? Welex has a large staff of specially trained engineers, ready to tackle each individual well and map out the most effective completion program.

What about cost? If you want nothing more than holes in your pipe, you may find someone cheaper. But why risk a million dollar investment by choosing a company a few dollars cheaper in price but thousands of dollars short in experience and know-how.

What about new services? Through the years Welex has always led the field in offering new, proven Completion Services. As originator of jet perforating, Welex has more experience and technical know-how in this field than any other company. Welex's research engineers already are working on new developments that will become standards of the industry in the future, just as many of their past developments are now standards.

What about different types of wells? Here's another important question—and answer which again makes Welex the best choice. Welex is the *only* wireline service company offering a *complete* selection of Completion Services for *every* well condition, whether cased hole, through tubing, tubingless or open hole.

And speaking of hole conditions, Welex has the most complete selection of perforating guns for every type of hole. Let Welex's experienced engineers solve your completion problems.

Experience?

There's no substitute for experience.

In well completions, the company with the most experience is the logical choice.

When you select Welex, originator of jet perforating, you're getting the company that engineered and developed most of today's modern Completion Services. Welex has the know-how, gained from research and field experience, to solve any completion problem.

And for optimum size hole perforations and deepest penetration, proven jet charges from Welex research facilities out-perform all others—both in laboratory tests and in your well.

WELEX, INC.

ORIGINATORS OF Welex JET PERFORATING

General Offices: 1400 East Berry, Fort Worth, Texas
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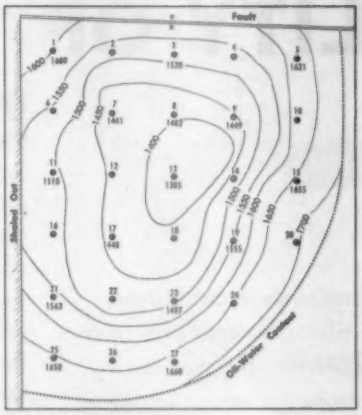
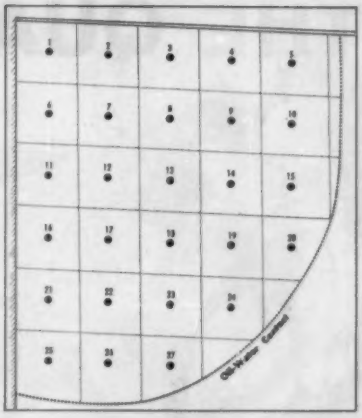


ISOPACHOUS MAP of a sandstone reservoir. Fig. 1.



ASSUMED DRAINAGE AREA has been assigned to each well in the field. Fig. 2.

neering than reservoir pressure. It is needed to analyze reservoir performance, calculate productivity indexes, evaluate reserves, institute repressuring, and define the physical characteristics of the reservoir fluid at any time.[1]

Normally pressure surveys are conducted for a lease or pool every 6 to 12 months. The practice is to survey about one-third to one-half of the wells each time. Some alteration (when possible) of the wells selected may be done to maintain pressure histories on as many wells as possible. Or, rather than alternating, the same wells (called "key wells") may be surveyed each time in order to have a continuous, more consistent history.

The wells selected are shut in for 24 hours (sometimes 48 to 72 hours, or even more, may be required) to allow the bottom-hole pressures to build up to or equalize with static reservoir conditions. The pressure in each well in the survey is then measured with a bottom-hole-pressure bomb.[2] For those cases where too much time is required for the bottom-hole pressure to reach static conditions, pressure-buildup tests may be used.[3 4]

Measurements made with properly calibrated subsurface-pressure gages may be read to an accuracy of 3 to 5 psi. in every 1,000 psi. The pressures measured represent the average reservoir pressure within the drainage radius of each respective well. Due to variations in permeability, structural elevation, sand thickness, well allowables, edge-water encroachment, gas-cap encroachment, or other causes, the reservoir pressures measured may vary appreciably from well to well over a lease or reservoir.

Usually the deviation caused by differences in structural elevation is eliminated by referring the measured pressures to a common datum. The datum is a horizontal plane normally selected about in the middle of the producing section. Good practice involves computation of the reservoir pressure at the middle of the sand in each well, using the pressures measured at the last stop and the gradients (psi./ft.) existing at the bottom of the wells. From the middle of the sand the reservoir pressures are computed at the datum, using the existing hydrocarbon gradient since it is desired to know the pressure in the hydrocarbon phase.

In the application of the material-balance equation, as in other reservoir problems, average reservoir pressures are required. This problem shows four ways of averaging pressure measurements. The simplest and possibly most used is the arithmetic average. In all averaging procedures nonrepresentative pressures are excluded. These may result from insufficient buildup, tubing leaks, or instrument failure.

Since the pressure measured at the center of each producing well represents the volume from which that well drains, the volumetric averaging procedure should give the most suitable results for material balance or calculations treating the reservoir as a whole. There are many different ways of determining the area and sand volume drained by a well. Fig. 2 shows the areas assigned in this case. Except for the edge wells, the spacing was taken as the drainage area of each well. Average sand thickness over this area was obtained by laying Fig. 2 over the sand isopach map of the pool, Fig. 1. Table 1 shows the area, average net sand thickness, and net sand volume of each drainage area. Note that an average pressure was estimated from Fig. 1 for each drainage area. The isobaric map, Fig. 1, is useful in averaging pressures and for graphically presenting pressure gradients, highs, and sinks over a pool. In this case the higher pressure along the oil-water contact probably indicates some edge-water encroachment. Such maps drawn over intervals of time provide a good visual history of reservoir-energy variations.

Note in this problem that two different procedures have been used in weighing by area, use of drainage areas, and areas between isobars, Table 2. Area weighing should give a good average where the net sand thickness does not vary appreciably over the pool. Where enough measurements are made over a pool to account for variations in net sand thickness, area of drainage, allowables, and rock properties, the arithmetic average also gives reliable averages. It is the simplest to develop and should be used where possible.

Where a gas cap exists above the oil column, it is usually advisable, for material-balance purposes, to obtain an average pressure for the gas cap as well as for the oil portion of the reservoir. In this case, bottom-hole pressures in the gas cap zone should be adjusted to a datum representative of the average elevation in the gas cap. As before, oil-zone pressures should be adjusted to the oil-column datum representing the average elevation of the oil portion of the reservoir. Correction to the datums will be by reservoir free gas or oil gradients, depending on whether the adjustment is through the gas cap or oil column, i.e., above the gas-oil contact or below. This, incidentally, leads to a good way of determining the elevation of the gas-oil contact:

On a coordinate graph of pressure versus elevation, draw a reservoir-oil gradient up from the elevation of the pressure measurement from a well in the oil column, and draw a gas gradient down from the elevation of the pressure measurement from a nearby well in the gas cap. The elevation where the two gradient lines intersect should be the gas-oil contact.

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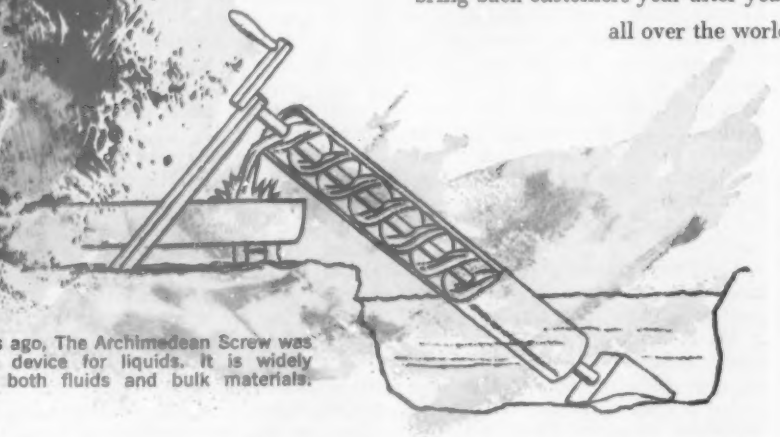
THE QUALITY OF THINKING

Archimedes, the ancient Greek philosopher, developed principles of mathematics and mechanics which unlocked secrets leading to the development of some of our most modern processes. His mind was at home in the farthest reaches of the abstract, at work in the closest confines of the practical.

At Brown & Root — whether it is one mind, or a group of minds — thinking knows no boundaries for inspiration. Problems in engineering and construction are solved in ways that consistently save our clients time and money. Brown & Root places a premium on the quality of thought, combined with thoroughly-seasoned knowledge and experience. The results bring back customers year after year, all over the world.



Over two thousand years ago, The Archimedean Screw was introduced as a lifting device for liquids. It is widely used today in moving both fluids and bulk materials.

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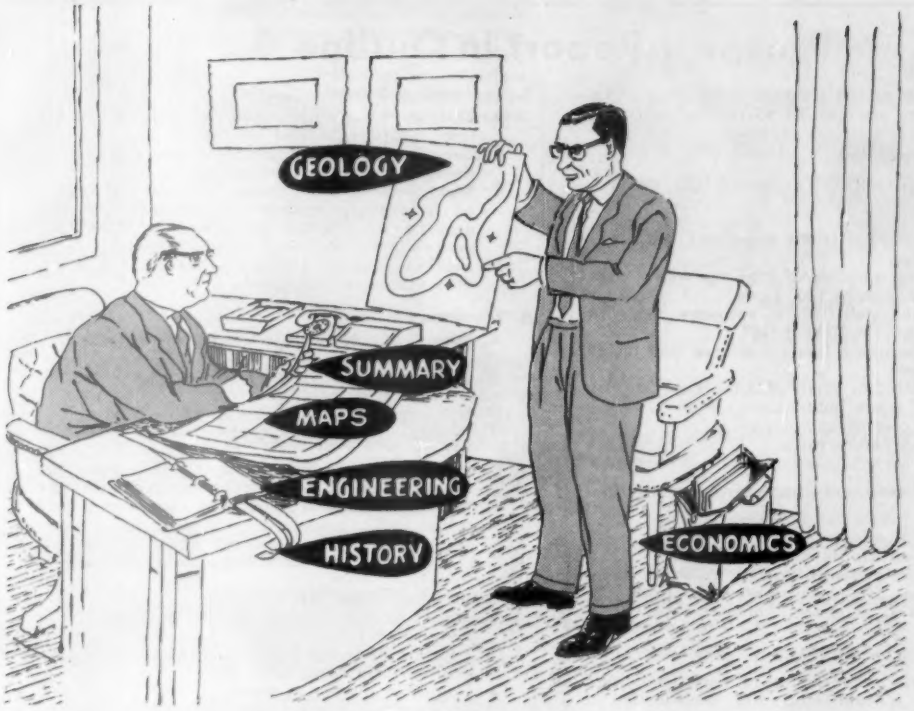

"The problem of presenting a drilling prospect to an investor whose knowledge of the oil business may be limited is at best not easy . . . The operator, the investor, and the oil industry will all profit by the approach described here."

What the investor wants to know

. . . if he's going to be sold on investing in your proposition. Here's some helpful advice from a pro.

CONDITIONS in the oil business have conspired to force individual operators and small independent companies to turn more and more to outside-investor capital to finance drilling programs.

The operator's ability to support a drilling program that will increase his income and profits and maintain his ratio of production to proven reserves has been impaired by several factors. These include stringent oil-production restrictions in the Southwest, the resulting reduced net income, and increased costs per prospect in the more promising (deeper) areas. Hence the operator must rely increasingly on outside capital to survive. Otherwise he cannot meet oil-production payments or loan obligations.

At the same time, experience of investigators, quite apart from the normal risks associated with the oil business, has tended to close some financial doors that have been open to the oil man. Information on which investors have been asked to judge a deal has often been incomplete or otherwise inadequate.

Communication problem. The problem of presenting a drilling prospect to an investor whose knowledge of the oil business may be limited is at best not easy. So it is not surprising that the operator has sometimes left the wrong impression. He has been unable to get his story across, simply because of inability to communicate. Or he has not told the whole story, perhaps because his own experience indicates that an investor does not appear interested in the whole story.

Whatever the reasons, operators in presenting drilling prospects have often emphasized the tax angle. They indicated the greatest reserve estimate possible. They minimized risks and did not disclose all of the factors affecting the investor's future net income. As a result, many investors whose first unschooled opinion was that all successful wells were money-makers had a rude awakening. They lost all

BY ADDISON L. HAYNER

. . . petroleum consultant specializing in oil and gas-property evaluation, geological exploration, and reservoir analysis. A graduate of Columbia University in geology and science, he was with Standard Oil Co. of Texas from June 1948 to April 1952 serving as seismic-reflection field-party coordinator, production-development geologist, and district geologist in West Texas and Southeast New Mexico. He was with Reiter-Foster Oil Corp. (now Baruch-Foster Corp.) as chief geologist, general manager of oil operations, and corporation secretary from May 1952 to March 1958, when he entered the consulting field. He lives in New York City.

Prospect Report in Outline

1. **A plate or map of the general area** around the prospect showing its relation to producing fields.

2. **Summary of proposition.**
   - A. Depth of proposed well.
   - B. Main objective.
   - C. Location.
   - D. Acreage assembled in the prospect.
   - E. Spudding date.
   - F. What might be anticipated from the well if commercial production is found.
     - (1) Total estimated future recovery (bbl. or M.c.f.)
     - (2) Investor working interest offered and future net income.
     - (3) Investor cost to point of completion, or risk money if a dry hole.
     - (4) Investor cost of completion.
     - (5) Investment-return ratio.

3. **Short history of area** and prospective acreage relationship.
   - A. Location of pipelines.
   - B. Trucking, if anticipated, and its cost.
   - C. In case of oil, allowable and market situation.
   - D. In case of gas, list main points of contract.
   - E. Lease liabilities or special commitments.

4. **Geological basis for drilling.**
   - A. Indicate what is known, what is assumed, and show by a contour map and cross-section if possible.
   - B. Attach key electric logs.
   - C. Indicate main potentially productive section and include any others that are possibilities.
   - D. Appraise possibilities for the remaining acreage if the well is successful.

5. **Engineering Section.**
   - A. Discuss the method used in arriving at the total future estimated recovery.
   - B. Give facts of surrounding or nearby producing fields to help substantiate figures.
   - C. State how the well should normally be expected to produce, taking into consideration any proration, production problems, and future expense for equipment or remedial work.
   - D. Mention secondary recovery only if it is a distinct economic possibility.

6. **Economic Section.**
   - A. Total estimated future recovery per well (bbl. or M.c.f.).
   - B. Less royalty and overriding royalty (bbl. or M.c.f.).
   - C. Net working-interest reserves (bbl. or M.c.f.).
   - D. Investor working-interest reserves (bbl. or M.c.f.).
   - E. Investor income based on specified price per barrel or M.c.f., subtracting production taxes, trucking expense if applicable, etc., from posted price.
   - F. Investor operating expense (including all charges and fees and, if possible, ad valorem taxes).
   - G. Investor future net income.
   - H. Estimated fair market value—show method of arriving at same.
   - I. Investor cost (specifying acquisition of lease, drilling, and completion cost).
   - J. Length of payout in years.
   - K. Investor return ratio on investment (before income taxes).

While it is not a part of the report proper, the operator should have ready a synopsis of his own experience, ability, and financial responsibility, and letters of reference.

interest in any future drilling deal, regardless of its merit.

In this climate, how can the prudent operator compete for money that is looking for the best return? The above outline is offered as a guide for a report that is designed to open investor doors by providing a sound basis for decision on whether to participate in a venture. It will serve as a check list for the operator. It will also alert the investor to the items that he should review in appraising a deal.

Purpose of Report

This form need not necessarily be followed rigidly, as there are types of deals that do not apply. However, it is advised for those who present drilling prospects, wildcat or development. It should provide a clear picture of the proposal and its potential. It will also offer the investor an elementary education in some of the aspects of finding, drilling, completing, producing, and selling hydrocarbons. He will not only be in a better position to appraise the deal; he can also, if he wishes, have the report checked quickly and without too much expense.

Not the least of the advantages of preparing such a full report is the aid to the operator himself in evaluating the suitability of a prospect for his own company. It should encourage his staff to use realistic figures showing pertinent actual recoveries, or sound estimates. The staff may wish to elaborate on the possibilities of greater or lesser net effective producing intervals, and their effect on reserves, assuming the same normal reservoir characteristics. But the watchword should be realism (which is another word for honesty).

The realistic approach, revealing all relevant information, will at least minimize, if not eliminate, the type of surprises that have made investors wary of an oil deal. Such surprises have stemmed from a variety of sources: use of exaggerated recovery factors or those of exceptional fields, prices which excluded trucking costs, and gathering or production taxes, failure to anticipate certain expenses in figuring future net income. Another source of unpleasant surprises is slipshod staff work in preparing reports. One operator was embarrassed recently to have pointed out to him mistakes in arithmetic which completely upset the economics of his proposition.

The attractive features should certainly be clearly set forth, but the risks inherent in oil drilling should be explained just as clearly. It will help avoid disappointment resulting from the investors' receiving less monthly income, higher operating costs, and unexpected capital expenditures.

The approach suggested here will, I hope, inspire confidence on the part of investors who may find in a properly investigated drilling venture the opportunity for a better return than they now receive in other businesses. What investors need is a yardstick to enable them to evaluate an oil deal in the same basic manner as any other investment. A well-prepared report, along the lines suggested here, should provide that yardstick.

The operator wants a continuing source of capital to remain in business, to hold and improve his current position. A satisfied investor is his best insurance against having to spend time and money every year in locating new participants for his programs. The operator, the investor, and the industry will all profit by this approach.

RIDGID Thread Cutting Oils are available in convenient (4 ounce Nu-Clear only), 1 quart, 1 gallon, (2 gallon Nu-Clear only), 5 gallon, 30 gallon and 55 gallon containers.

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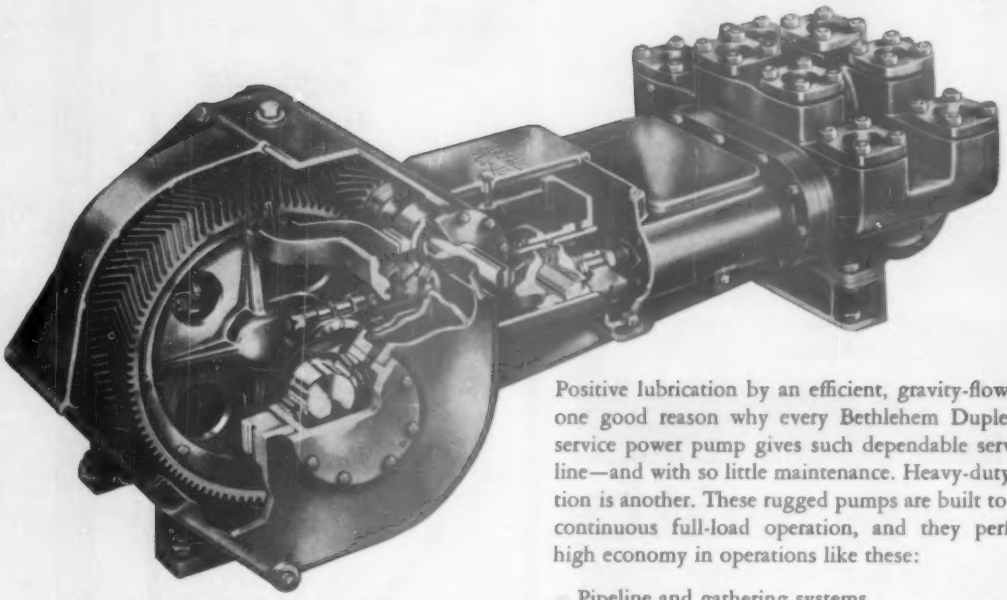
W-B Pump & Supply Co., Pampa, Texas
B-H Pump Service, Salmon City, Texas
Happy Co., Salem, Illinois

Thompson
PUMP COMPANY
Drawer 591 — Okmulgee, Oklahoma

The Bethlehem Duplex

Keeps Oil On The Move



Cut-away drawing of the U-510 Duplex shows how lubricating oil, continuously collected from the gear rim, flows through the main and pinion bearings and into the oil chest, from where it is directed to the crossheads and to the crosshead-pin and connecting-rod bearings.

Positive lubrication by an efficient, gravity-flow system is one good reason why every Bethlehem Duplex general-service power pump gives such dependable service in the line—and with so little maintenance. Heavy-duty construction is another. These rugged pumps are built to run under continuous full-load operation, and they perform with high economy in operations like these:

- Pipeline and gathering systems
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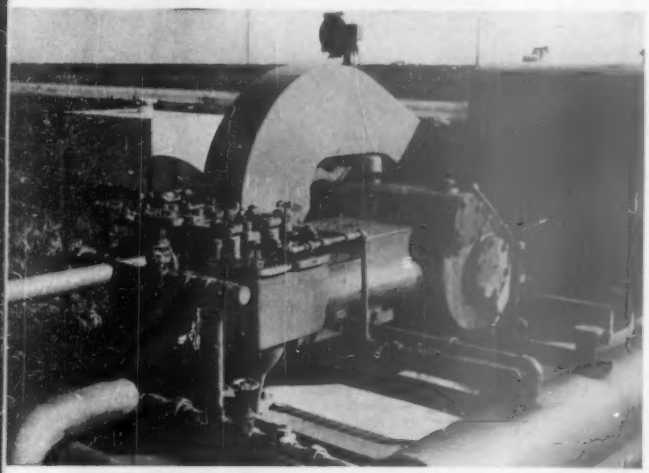
- Product, LPG, and oil-processing service
- Mud transfer and rig-water systems



On the job in a crude oil gathering system in West Texas, this Bethlehem UA-46 pump is good for many more barrels to come.

For the full story on the Bethlehem Duplex, write for our descriptive literature. Or inquire at our nearest office or store.

There's a size for every job. Choose between the U-33, UA-46, and U-510

Capacities: 155 to 13,500 BPD
Piston-Rod Loads: 2,400 to 12,000 lb
Pressures: 340 to 1,698 psi

For higher pressures, investigate Bethlehem's Triplex pumps, the TP-3, TP-4, and TP-6

Capacities: 100 to 11,700 BPD
Plunger Loads: 4,000 to 10,000 lb
Pressures: 566 to 5,000 psi

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SUPPLY DIVISION
General Offices and Export Dept.: 21 East Second St., Tulsa, Okla.
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BETHLEHEM STEEL SUPPLY DIVISION

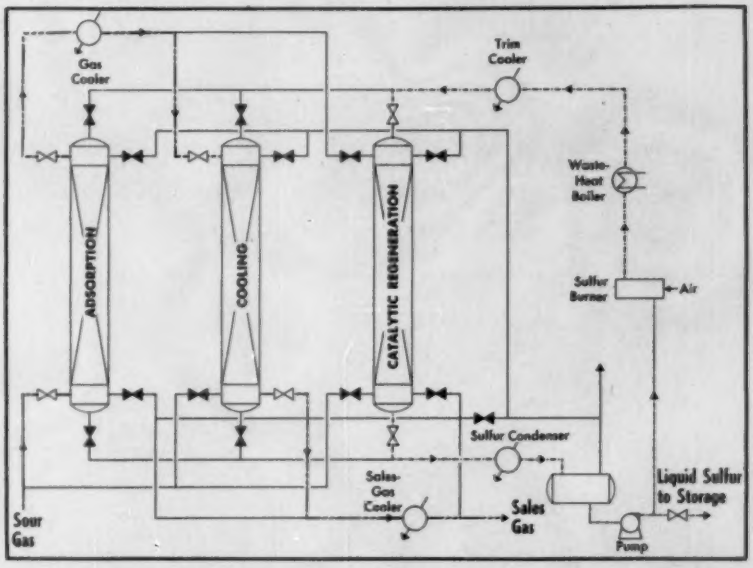
New process produces liquid sulfur directly from sour gas

A NEW sulfur-recovery process using synthetic zeolite bypasses one step in the conventional method of producing sulfur from sour natural gas (OGJ, Oct. 3, 1960, p. 67).

The process, developed by Harry Haines and Krell & Associates, Inc., of Houston, is similar to those used in short-cycle hydrocarbon-recovery units, but uses a different adsorbent and a totally new type of regeneration cycle.

The adsorbent, calcium aluminosilicate, is an excellent Claus catalyst and when "loaded" with hydrogen sulfide (H_2S), it can be regenerated at 600° F. with sulfur dioxide (SO_2) to produce sulfur vapor and water vapor. Liquid sulfur is recovered by condensation of these vapors.

Maloney-Crawford Tank & Service Co., Ltd., which holds an exclusive franchise to manufacture and sell these units in Canada, is presently fabricating a 100-M.c.f.d. plant to treat natural gas containing 15% H_2S. This plant should result in a big saving over conventional units, since the new unit dehydrates, sweetens, and produces sulfur from sour gases in a single plant.



SULFUR DIOXIDE SIMULTANEOUSLY REGENERATES the adsorbent bed and converts the hydrogen sulfide to sulfur vapor.

Process. As shown in the attached diagram, this unit is an adsorption plant which operates on relatively short cycles (45 to 180 minutes). Unlike most hydrocarbon-recovery units, the time cycle is determined by sour-gas concentration rather than limiting superficial linear velocities.

The pattern of gas flow is similar to European adsorption plants where the gas passes in series through two towers.

Sour gas enters the bottom of the adsorption tower and flows upward. Sensible heat, stored in the sweetened sales gas during the adsorption period, is removed by the gas cooler.

The cooled sweet gas then passes downward through the cooling tower to cool freshly regenerated adsorbent, and then to a sales-gas cooler, before entering the sales-gas pipeline.

Series flow provides a valuable safety factor during adsorption. If by accident a plant upset occurs, the cooling tower acts as a secondary adsorption tower to trap residual hydrogen sulfide in the sales-gas stream.

Approximately one-third of the liquid sulfur leaving the sulfur condenser is recycled to a sulfur burner for production of sulfur dioxide gases. These gases enter a waste-heat boiler for steam generation and pass to a trim cooler for accurate temperature control.

The hot sulfur-burner gases then flow downward through the catalytic regeneration tower for simultaneous stripping of, and reaction with, the adsorbed hydrogen sulfide. Vapors leaving the bottom of the tower contain nitrogen, sulfur vapor, water vapor, and small quantities of unreacted hydrogen sulfide and sulfur dioxide.

These vapors are then cooled in the sulfur condenser for production of liquid sulfur, and the noncondensable gases are vented to the atmosphere. Liquid sulfur is pumped to storage.

At the beginning of the catalytic regeneration period the cold adsorbent acts as a heat sink, producing a temperature rise across the tower which is lower than the rise obtained in a conventional Claus catalyst chamber operating under steady-state conditions.

The small temperature rise allows production of relatively high-pressure steam in the waste-heat boiler, which has an exit temperature closely approximating the exit temperature of the catalytic regeneration tower (600° F.), without imposing a heavy heat duty on the trim cooler. Unless lower-pressure steam be desired, the temperature drop across the trim cooler is essentially equal to the temperature rise across the catalytic regeneration tower.

Economics. Cost estimates have been prepared for a commercial plant to treat 8 M.M.c.f.d. of sour natural gas containing 15% hydrogen sulfide (40 long tons of sulfur daily). This plant would cost approximately $600,000, exclusive of offsite facilities.

Cooling water is the only essential utility, since the plant derives its energy requirements from the sour portion of the inlet gas, compared with other processes that burn a portion of the sales gas for fuel. With the long-term trend toward higher natural-gas prices and lower sulfur prices, this differential advantage in "fuel-gas" costs should increase in favor of the Haines process.

In addition, excess steam can be used to drive a refrigerated cooling system for hydrocarbon-dewpoint reduction of the sales gas, an important feature in Canadian operations where gas-transmission companies require a 15° F. hydrocarbon dew point at 800 psia.

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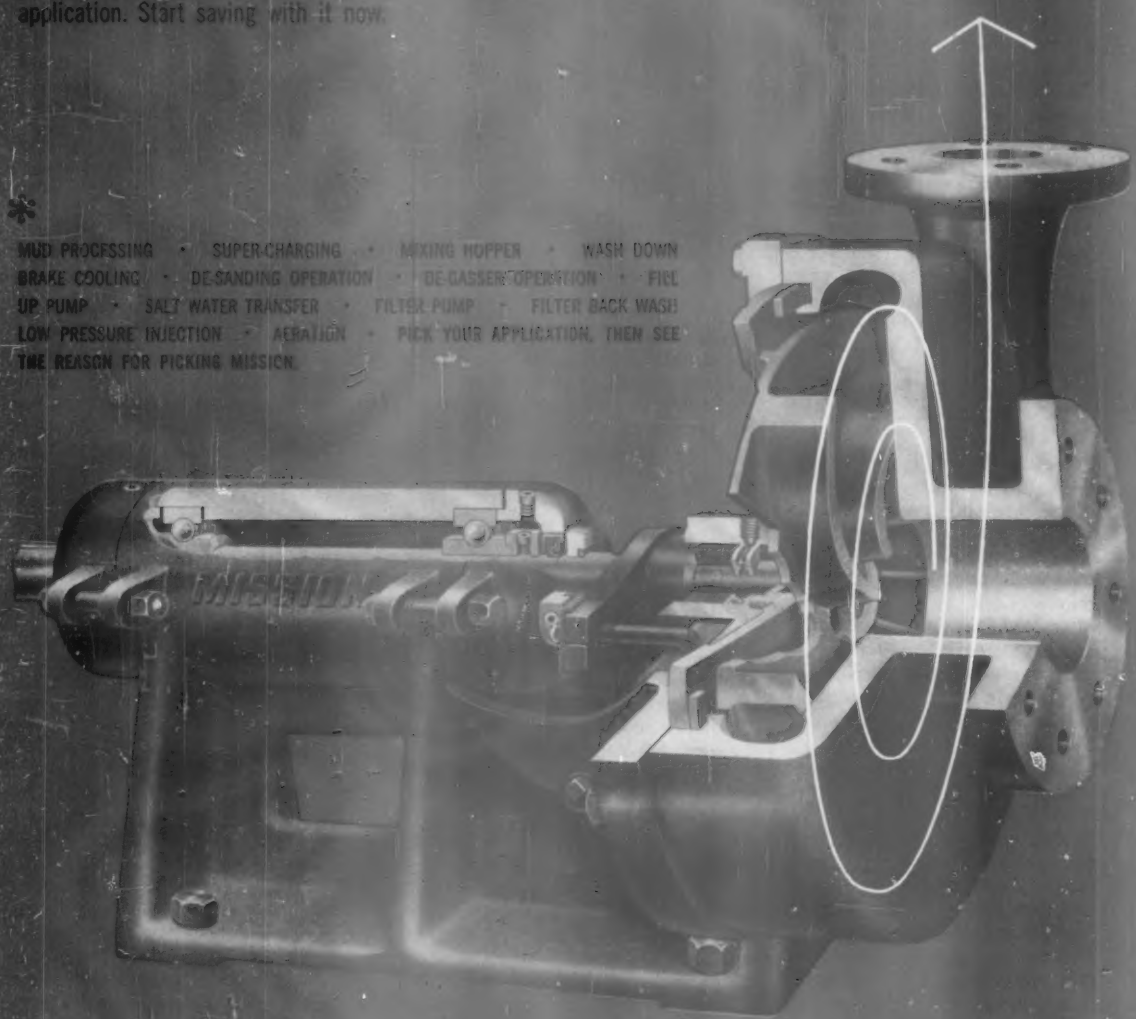

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Monthly Report on PIPELINE CONSTRUCTION

PIPELINE ACTIVITY reported here is compiled from surveys by The Oil and Gas Journal among pipeline companies and construction contractors.

This summary report appears in the last issue of the Journal each month. New construction projects are reported weekly in Pipeline Briefs in the Journal's news section.

Projects are listed in three groups—U. S., Canadian, and Foreign—and according to type of line—crude, products, natural gas, or miscellaneous.

★ The star symbol indicates the first appearance of the project in the Journal's survey.

U. S. Crude Oil Pipelines

CAPE PIPE LINE CO. (Sun Oil Co., Cities Service Co., Atlantic Refining Co.), Philadelphia.
Project: Line from lower Delaware Bay to Philadelphia.
Status: Proposed.

CHAMPLIN OIL & REFINING CO., 5301 Camp Bowie Blvd., Fort Worth.
★ Project: 27 miles of 4 and 6-in. gathering line in Dover and Hennessey fields, Oklahoma, plus 12 miles of 4-in. and 20 miles of 6-in. from Dover to Hennessey to Enid, Okla.
Status: Under way.
Contractor: Sadler Bros. Construction Co. Oklahoma City.
Completion: January 15, 1961.

CONTINENTAL PIPE LINE CO., Drawer 1267, Ponca City, Okla.
★ Project: 32-mile line from South Dover, Mid Dover, and North Dover fields to existing line which takes crude from Crescent pool area, Logan County, Oklahoma.
Status: Under way.
Project: 4 miles of 3-in., 18 of 4-in., 123 of 6-in., 323 of 8-in., and 53 of 10-in., in new Glacier Pipe Line System from Cutbank, Mont., to Byron, Wyo.
Status: Under way.
Contractor: R. H. Fulton & Co., Lubbock, Tex.
Completion: August 31, 1961.
Project: 20 miles of 8-in. from Grand Isle to Golden Meadow, La.
Status: Under way.
Contractor: Glaser Construction Co., Inc., Lafayette, La.
Completion: February 25, 1961.

GILLETTE PIPELINE, INC., and A. W. HARTWIG, INC.
Project: A 102-mile line from Dead Horse Creek field to Casper, Wyo.
Status: Pending Wyoming Public Service Commission approval.

INTERNATIONAL OIL PIPELINE CORP., New York.
Project: Would own U. S. section of 1,500-mile, 30-in. line proposed by Mid-Continent Pipe Lines, Ltd., from Edmonton, Alta., to Chicago. (See Canada).
Status: Proposed.

MATADOR PIPE LINE CORP., Denver.
Project: 175-mile line from Burke, Bottineau, and Renville counties, North Dakota, to Cromer, Man.
Status: Pending approval of Canadian National Energy Board.

MID-AMERICA PIPELINE CO., Skelly Building, Tulsa.
Project: 405-mile, 10-in. condensate line from Superior, Wis., to Chicago. It would connect at Superior with the trunk line of Lakehead Pipe Line Co., eastern division of Interprovincial Pipe Line Co. Shipments would be fed into Interprovincial from gathering lines now under consideration in Alberta.
Status: Proposed.

NORTHWESTERN REFINING CO., Box 248, St. Paul Park, Minn.
Project: 4, 6, and 8-in. gathering lines in Glenburn field, Renville and Bottineau counties, North Dakota.
Status: Has state approval.

ROCK ISLAND OIL & REFINING CO., INC., 321 West Douglas Ave., Koch Building, Wichita 2, Kans.
★ Project: 60 miles of 6 and 7-in. from fields in Red Willow County, Nebraska, to Arapahoe Pipe Line's Colby, Kans., station.
Status: Under way.
Contractors: Gilmore Construction Co. Hays, Kans.; Plains Construction Co., Kimball, Neb.; and Barney Bridges Ardmore, Okla.
Completion: Spring 1961.

TETON PIPE LINE CORP., 1700 Broadway, Denver 2.
Project: 45 miles of 6-in. gathering and transmission line in Dead Horse Creek, Barber Creek, and Sussex fields in Campbell and Johnson counties, Wyoming, to connect with Service Pipe Line Co. facilities at Sussex.
Status: Approved by Wyoming Public Service Commission.

U. S. Products Pipelines

CALNEV PIPE LINE CO. (owned principally by Union Pacific Railroad Co., Union Pacific Building, Omaha, Neb.).
Project: 212 miles of 8-in. and 13 miles of 6-in. from Colton (near Los Angeles) to Las Vegas, Nev. The 225-mile line will carry gasoline, diesel fuel, and jet fuel, serving Victorville and Barstow, Calif., and Nellis Air Force base in Nevada.
Status: Under way.
Contractor: Williams Brothers, Tulsa, Okla.
Completion: March 1, 1961.

NEW HAVEN PIPELINE, INC., 515 Madison Ave., New York 22, N. Y.
Project: 12-in. line from New Haven to Hartford, Conn., and 10-in. from there to Springfield, Mass., with a 6-in. spur to Westover Air Base at Ludlow, Mass.
Status: Proposed.

SEADRIFT PIPELINE CORP. (subsidiary of Union Carbide Corp., 30 East 42 St., New York 17).
Project: 56 miles of 6-in. from Bay City to Seadrift, Tex.
Status: Under way.
Contractor: Sharman, Allen, Gay & Taylor, Inc., Houston.

SOUTHERN PACIFIC PIPE LINES, INC., 65 Market St., San Francisco.
★ Project: 70-mile 8-in. jet-fuel line from Stockton to Castle Air Force Base near Atwater, Calif.
Status: Bids were being received in December.
Completion: April 1, 1961.

TRANS-SOUTHERN PIPELINE CORP. (subsidiary of Transcontinental Gas Pipe Line Corp., Box 296, Houston).
Project: 1,080 miles of 4 to 12-in. LPG line from Mont Belvieu, southeast of Houston, to Danville, Va., and 275 miles of 6-in. spurs, including 215 miles from Atlanta to Waycross, Ga., 25 miles from Linden to Demopolis, Ala., and 35 miles from Laurel to Hattiesburg, Miss.
Status: Planned, with target date for start of construction April 1961.
Completion: By November 1, 1961.

WARREN PETROLEUM CORP., PHILLIPS PETROLEUM CO., UNION TEXAS NATURAL GAS CORP., and **TULOMA GAS PRODUCTS CO.**
★ Project: A 1,100-mile 8 to 10-in. propane line from the Houston area to North Carolina.
Status: Under consideration. Preliminary studies have been completed.

WEST SHORE PIPELINE CO. (Stock owned by Pure Oil Co. and Interstate Oil Pipe Line Co., a subsidiary of Standard Oil Co. of New Jersey).
Project: 200-mile line from Chicago to Milwaukee and Green Bay, Wis., with main line possibly 16-in. and laterals 12-in.
Status: Proposed. The line has backing of 10 oil companies.

U. S. Natural Gas Pipelines

ALASKA PIPE LINE CO., Houston, Tex.
Project: 74 miles from Kenai Unit gas field to Anchorage.
Status: Construction suspended until spring 1961.
Project: Extension of Kenai-Anchorage line to Fairbanks.
Status: Alaska Pipe Line Co. has ordered economic and engineering studies to determine feasibility of such a proposal.

ALGONQUIN GAS TRANSMISSION CO., 25 Faneuil Hall Square, Boston 9, Mass.
Project: 30 miles of line in Massachusetts.
Status: Approved by FPC.

ARKANSAS WESTERN GAS CO., Box 405, Fayetteville, Ark.
Project: New lines from Altus, Coal Hill, and Rock Creek fields to the main system.
Status: Approved by Arkansas Public Service Commission.

BORDER GAS TRANSMISSION CORP. (owned by Lehman Brothers, New York

PIPELINE CONSTRUCTION

investment firm, and Rio Gas Gathering Co., 615 National Bank of Commerce Building, San Antonio 5, Tex.).
Project: Gathering lines in Starr, Zapata, Jim Hogg, Brooks, and Webb counties, Texas.
Status: Proposed.
Project: Gathering lines in Dimmit, Zavala, and La Salle counties, Texas.
Status: Proposed.

COASTAL STATES GAS PRODUCING CO., 200 Petroleum Tower, Corpus Christi, Tex. (Subsidiaries include Lo-Vaca Gathering Co. and South Texas Natural Gas Gathering Co.).
Project: 330 miles of various size pipe from Three Rivers area to southeast Lavaca County, Texas.
Completion: April 1, 1961.

COLORADO INTERSTATE GAS CO., Box 1087, Colorado Springs.
Project: 7 miles of 20-in. in Texas Panhandle.
Status: Pending FPC approval.
Completion: 1961.
Project: 109 miles of 26-in. from Texas Panhandle to southeastern Colorado; 134 miles of 34-in. from there to Pueblo, and 107 miles of 30-in. on to Denver; 155 miles of 34-in. from Green River, Wyo., to Provo, Utah.
Status: Pending FPC approval.
Completion: 1961.
Project: 32 miles of 6-in. from Central Colorado to Trinidad.
Status: Pending FPC approval.
Completion: 1961.

COLORADO OIL & GAS CORP., Denver.
Project: 402-mile line from Gubik field to Fairbanks, Alaska.
Status: Proposed.

EL PASO NATURAL GAS CO., Box 1492, El Paso, Tex.
Project: 119 miles of 30-in. Permian-San Juan crossover loop.
Status: Pending FPC approval.
Completion: 1961.
Project: 17 miles of 30-in. near Spokane, Wash.
Status: Pending FPC approval.
Completion: Not known.
Project: 34 miles of 20-in. from Puckett tie-in to Goldsmith, Tex.
Status: Pending FPC approval.
Completion: 1961.
Project: 23 miles of 20-in. from Goldsmith to the Eunice-Plains line, and 395 miles of 34-in. from Thistle, Utah, to near Las Vegas, Nev.
Status: Pending FPC approval.
Completion: 1961.
Project: Loop on the San Juan mainline, involving 27½ miles of 34-in.
Status: Pending FPC approval.
Completion: Not known.
Project: About 228 miles of 30-in. from Coquat to Sonora, Tex.
Status: Pending FPC approval.
Completion: Not known.

EQUITABLE GAS CO., 420 Boulevard of the Allies, Pittsburgh, Pa.
Project: 15 miles of 16-in. in Monongalia County, West Virginia, and Greene County, Pennsylvania.
Status: Approved by FPC.
Completion: October 1961.
Project: 6 miles of 20-in. in Greene County, Pennsylvania.
Status: Approved by FPC.
Completion: October 1961.
Project: 17 miles of 20-in. in Greene and Washington counties, Pennsylvania.
Status: Approved by FPC.
Completion: October 1962.

HOUSTON TEXAS GAS & OIL CORP., Box 10400, St. Petersburg 33, Fla.
Projects: 196 miles of 2 to 6-in. in various parts of Florida.
Status: Pending.

LONE STAR GAS CO., 301 South Harwood St., Dallas 1.
★ Project: 16 miles of 6 and 8-in. gathering line in Palo Pinto County, Texas.
Contractor: Company forces.
Completion: January 1961.
Project: 52 miles of 18-in. from Parker County to Palo Pinto County, Tex.
Contractor: Company forces.
Completion: March 1961.

LO-VACA GATHERING CO. (see parent company, Coastal States Gas Producing Co.)

MANUFACTURERS LIGHT & HEAT CO., Union Trust Building, Pittsburgh 19, Pa.
Project: 10½ miles of 24-in. Washington-ton and Beaver counties, Pennsylvania.
Status: Planned.
Completion: September 1961.
Project: 7 miles of 4 to 12-in. in the Victoria storage field, Marshall County, W. Va.
Contractor: Felmont Oil Corp.
Completion: March 1961.

MISSISSIPPI RIVER FUEL CORP., 407 North 8th Street, St. Louis 1, Mo.
Project: 5 miles of 16-in. and 15 miles of 12-in. from Collinsville, Ill., to St. Jacob, Ill.
Status: Pending FPC approval.

MISSISSIPPI RIVER TRANSMISSION CORP. (Mississippi River Fuel Corp.), St. Louis.
Project: 94 miles of 18-in. from Johnsonville, Ill., to the St. Louis area.
Status: Pending FPC approval.

MONTANA POWER CO., Box 1338, Butte, Mont.
Project: 16-in. line from Carway, Alta., to Cut Bank, Mont.
Status: Proposed.

NATURAL GAS PIPELINE CO. OF AMERICA, 122 South Michigan Avenue, Chicago.
Project: 17 miles of 8-in. and 10 miles of 6-in. near Rockport, Tex., including a crossing of Copano Bay.
Status: Under way.
Contractor: Houston Contracting Co.
Project: 371 miles of 30-in. loop of main line between Wharton County, Texas, and Piatt County, Illinois.
Status: Under way.

PACIFIC GAS & ELECTRIC CO., 245 Market St., San Francisco.
Project: 67 miles of line from Kettleman Hills to Morro Bay, Calif.
Project: 120 miles of 34-in. looping of Topock-Milpitas main line.
Status: Planned. Pending FPC approval.
Completion: 1961.
Project: 291 miles of 36-in. from the California-Oregon border to Antioch, Calif. (Part of a 1,400-mile project to move Alberta gas to San Francisco.)
Contractor: H. C. Price Co., Bartlesville, Okla. (Bechtel Corp. San Francisco, is the engineering manager.)
Status: Under way.
Completion: System will be in use during 1961-62 winter season.

PACIFIC GAS TRANSMISSION CO. (Pacific Gas & Electric Co., San Francisco).
Project: 611 miles of 36-in. from the Canadian border at Eastport, Idaho, to the California border near Klammath Falls, Ore. (Part of a 1,400-mile project to move Alberta gas to San Francisco.)
Contractors: Western Pipe Line, Inc., Austin, Tex., and J. P. Neill & Co., Dallas, have contracts for the 465-mile southern portion. H. C. Price Co., Bartlesville, Okla., has contract for the 146-mile northern portion from Rosalia, Wash.,

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Bethlehem also produces four grades of alloy steel rods. The type 41, our newest, is a high-tensile, manganese-chromium-molybdenum alloy rod, engineered for non-corrosive and effectively inhibited wells.

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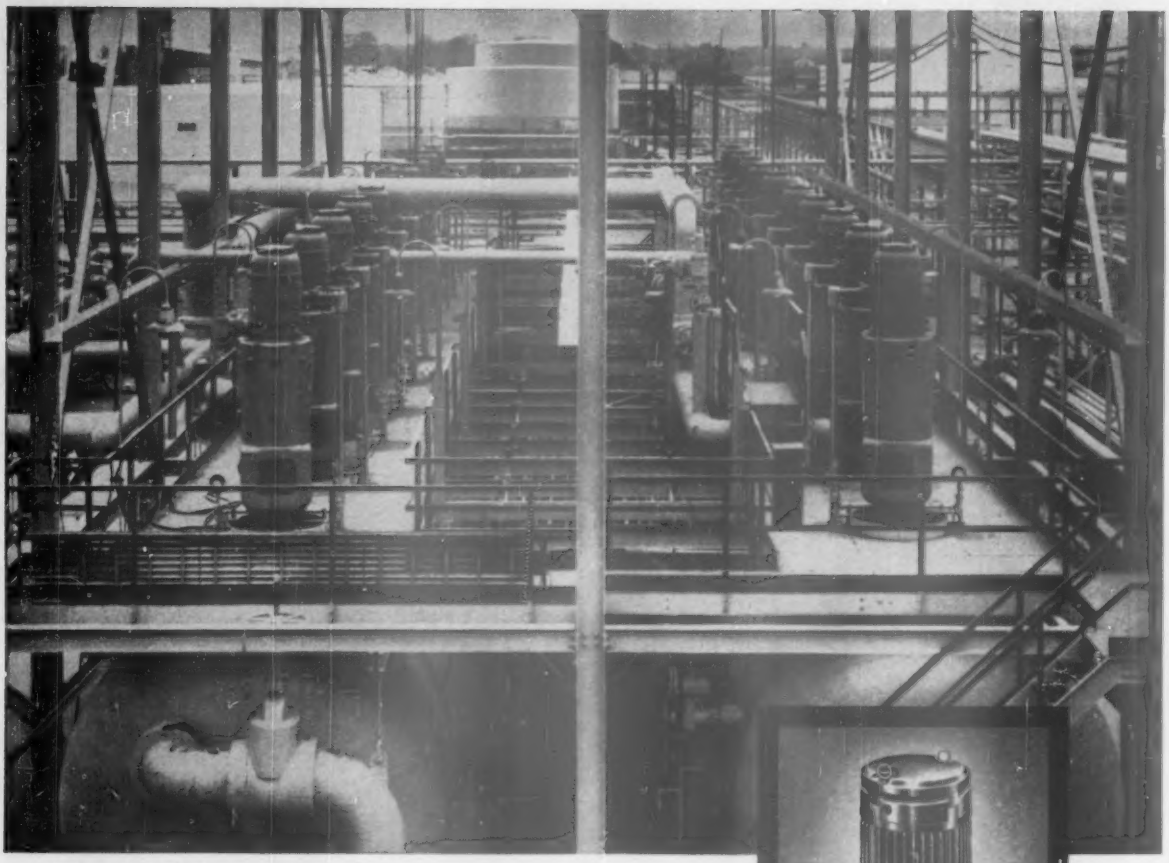

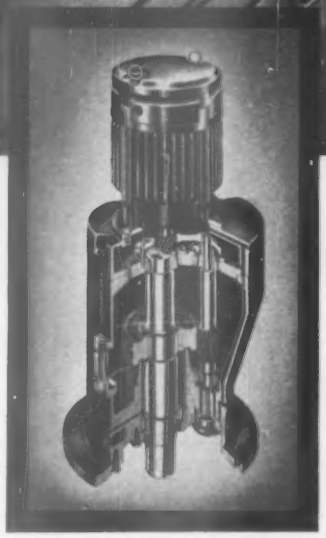

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PIPELINE CONSTRUCTION

to Eastport, Idaho. (Bechtel Corp., San Francisco, is the engineering manager.)
Status: Under way.
Completion: The system will be in use during the 1961-62 winter season.

PAN AMERICAN GAS CO., Box 591, Tulsa.
★ Project: 50-mile system from Pan American's terminal at Texas City to Pasadena and La Porte.
Status: Under way.

PIONEER NATURAL GAS CO., Amarillo
Project: 21 miles of 12-in. from Sudan to Muleshoe, Tex.
Status: Pending FPC approval.
Project: 12 miles of 10-in. from Muleshoe, Tex. northward.
Status: Pending FPC approval.

PUBLIC SERVICE CO. OF NORTH CAROLINA, Gastonia, N. C.
★ Project: 19½ miles of 14-in. near Stem, N. C.
Status: Planned.

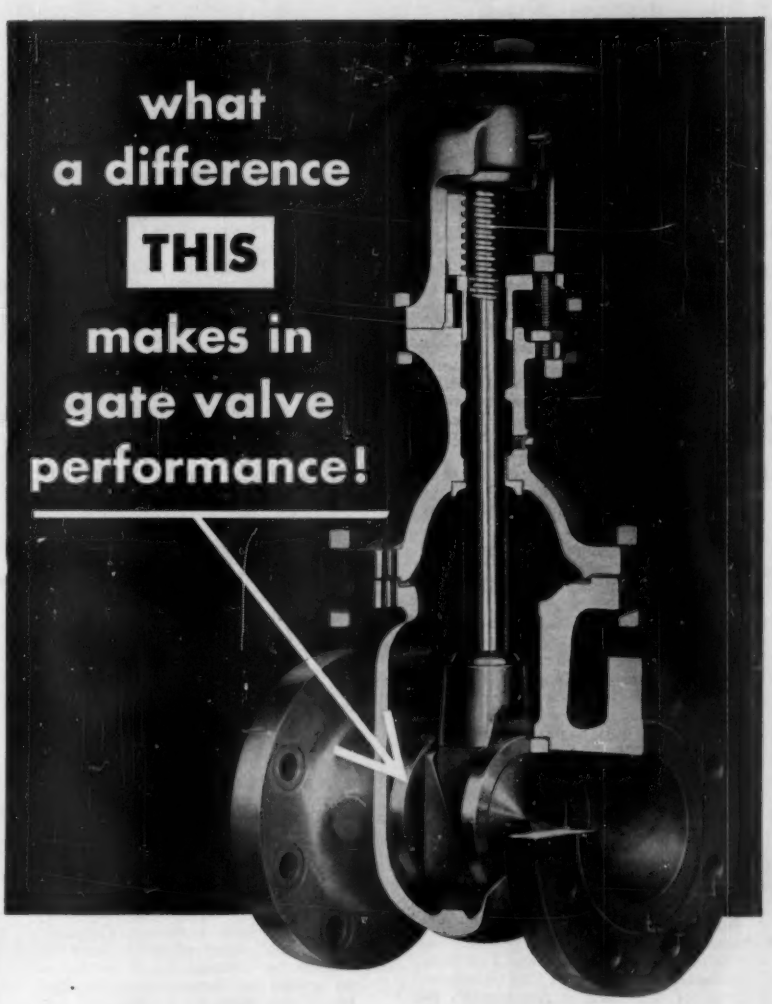
RIO GRANDE VALLEY GAS CO., Box 391, Brownsville, Tex.
Project: 60 miles of 12-in. in Hidalgo, Starr, and Jim Hogg counties from Moore field area to Prado field area, replacing and reconditioning existing line.

SOUTHERN CALIFORNIA GAS CO., and **SOUTHERN COUNTIES GAS CO. OF CALIFORNIA**, Los Angeles.
Project: 150-mile line across southern California from the Nevada border to the Los Angeles basin. Line would connect with a proposed El Paso Natural Gas Co. line extending to Rock Springs, Wyo.
Status: Pending approval of State Public Utilities Commission of California.

ST. LAWRENCE GAS CO., Ogdensburg, N. Y.
Project: 75 miles of line from Cornwall, Ont., to Ogdensburg, N. Y.
Status: Approved by FPC.

TENNESSEE GAS PIPELINE CO., a division of Tennessee Gas Transmission Co., Box 2511, Houston 1, Tex.
★ Project: 15 miles of 12-in. gathering line offshore Louisiana.
Status: Pending FPC approval.
★ Project: 11½ miles of 20-in. offshore Louisiana.
Status: Pending FPC approval.
Project: 21 miles of 16-in. gathering line from Louisiana coast to Block 46 in the Vermilion area.
Status: Pending FPC approval.
Project: 2 miles of 12-in. gathering line from Block 66 to Block 64, East Cameron area, offshore Louisiana.
Status: Pending FPC approval.
Project: 158 miles of 36-in. loop lines at various points between Kinder, La., and Centerville, Tenn.
Status: Approved by FPC.
Project: 50½ miles of 10 to 16-in. gathering lines offshore Louisiana.
Status: Approved by FPC.
Project: 12 miles of 12-in. gathering line from Louisiana coast to Block 17, East Cameron area, offshore Louisiana.
Status: Under way.
Contractors: Popich Marine Construction Co. and Brown & Root, Inc., Houston
Project: 166 miles of 36 and 30-in. loop lines at various points in Ohio and Pennsylvania.
Status: Pending FPC approval.

TENNESSEE GAS TRANSMISSION CO., Box 2511, Houston.
Project: For proposal to carry Texas gas to California via a 1,100-mile 30-in. line through Mexico, see Foreign Natural Gas listing.
★ Project: 292-mile line from the California-



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Mexican border to Los Angeles to tie in with above-mentioned line across northern Mexico.
Status: Tennessee Gas's subsidiary, California Gas Transmission Co., and Southern California Edison Co. have filed applications with California Public Utilities Commission.
Completion: July 1962.
★ Project: A line from producing fields in Texas to the Mexican-Texas border, which would connect with proposed line through northern Mexico to California.
Status: Tennessee Gas has formed a Texas subsidiary, Tennessee California Gas Transmission Co., to build and operate the Texas segment.

TEXAS EASTERN TRANSMISSION CORP., Box 1189, Houston 1.
★ Project: 66 miles of 30-in. loops between Vidor, Tex., and Lambertville, N. J.
Status: Temporary FPC approval.

TEXAS GAS TRANSMISSION CORP., Box 377, Owensboro, Ky.
Projects: 146 miles of new line including 6, 26, and 30-in. loops in Kentucky, Tennessee, Mississippi, Louisiana, and Indiana, and 50 miles of 8 and 16-in. to connect five fields in Terrebonne Parish, Louisiana.

TRANSCONTINENTAL GAS PIPE LINE CORP., 3100 Travis St., Houston, Tex
Project: 7 miles of 16-in. in New Jersey.
Status: Pending FPC approval.
Completion: 1961.
Project: 31 miles of 30-in. in Texas.
Status: Pending FPC approval.
Completion: 1961.
Projects: 36-in. as follows: 33 miles in Louisiana, 22 in Mississippi, 62 in Alabama, 39 in Georgia, 22 in South Caroline.
Status: Pending FPC approval.
Completion: 1961.

TRANSWESTERN PIPELINE CO., 618 First City National Bank Building, Houston 2, Tex.
★ Project: 240 miles of 4-in., 172 of 6-in., 134 of 8-in., 96 of 10-in., and 8 of 12-in. gathering line in Texas and Oklahoma. (Part of this listed in last month's report.)
Status: Under way.
Contractor: Sheehan Pipe Line Construction Co., Tulsa.
Completion: April 1961.

TRUNKLINE GAS CO., Box 1642, Houston.
Projects: About 155 miles of 30-in. loop in Illinois, Kentucky, Tennessee, Mississippi, and Louisiana, plus 17 miles of 24-in. loop from Lowry, La., to south of Iowa, La.
Status: Pending FPC approval.
Project: 52 miles of 20-in. from Bayou Sale to Cow Island, La.
Status: Pending FPC approval.

UNITED GAS PIPE LINE CO., Box 1407, Shreveport 92, La.
Project: 59 miles of 36-in. purchase lateral connecting Bastian Bay field, Louisiana.
Status: Pending FPC approval.
Completion: Fall 1961.

WASHINGTON GAS LIGHT CO., 1100 H St., NW, Washington 5, D. C.
Project: 16 miles of 24-in. from near Alexandria, Va., to Prince Georges County, Maryland.
Status: Approved by FPC.

U. S. Miscellaneous Pipelines

LINDE CO., a division of Union Carbide Corp., 270 Park Ave., New York 17.
Project: 8-mile pipeline to deliver oxygen from new oxygen and nitrogen plant on the Houston Ship Channel to Arco Steel and Diamond Alkali.
Completion: 1961.

TEXAS EASTERN TRANSMISSION CORP., Box 1189, Houston 1.
Project: 350 miles of 24-in. coal-slurry line to move West Virginia coal to electric companies in Pennsylvania, New York, and New Jersey. (Texas Eastern is working jointly with Consolidation Coal Co., Pittsburgh, Pa.)
Status: Proposed.
Completion: Possibly in 1962.

Canadian Crude Oil Pipelines

ACT OILS, LTD., 505 Eighth Avenue Building, Calgary.
Project: 450-mile line from Fort St. John area to Kitimat tidewater area of British Columbia.
Status: Proposed, but not for immediate future.

BITUMINOUS OIL PIPELINE CO. (Royalite Oil Co., Ltd., Royalite Building, Calgary.)
Project: A 250-mile line from Athabasca oil sands to Edmonton.
Status: Proposed.

HUDSON'S BAY OIL & GAS CO., LTD., 320 7th Ave. W, Calgary, Alta.
Project: 41 miles of 4 and 8-in. condensate line from the Waterton-Castle River area and Pincher Creek field in southwestern Alberta to Carway near the international border. The new line would then connect with Continental Pipe Line's Glacier crude system in Montana and Wyoming.
Status: Pending approval from Alberta government.

MATADOR PIPE LINE CORP., Denver
Project: 175-mile line from Burke, Bottineau, and Renville counties, North Dakota, to Cromer, Man.
Status: Proposed. (See U. S.)

MID-CONTINENT PIPE LINES, LTD., Edmonton, Alta.
Project: 1,500 miles of 30-in. from Edmonton to Chicago. U. S. section to be owned by International Oil Pipeline Corp., New York City.
Status: Pending Canadian Board of Transport Commission approval. W. C. Gilman & Co., New York City, has made preliminary study.

MINNESOTA PIPE LINE CO., First National Bank Building, St. Paul 1.
Project: 153-mile 16-in. line from Regina, Sask., to Clearbrook, Minn.
Status: Pending National Energy Board approval.

RANGELAND PIPE LINE CO., Calgary
Project: 111-mile line from Cessford field to Calgary.
Status: Pending approval of Alberta government.

TRANS-PRAIRIE PIPELINES, LTD., 12912 125 Ave., Edmonton, Alta.
Project: Expansion of gathering system in British Columbia will include 40 miles of 4-in. from Taylor to Dawson Creek; 30 miles of 6-in. from Boundary Lake to Taylor; 75 miles of 8-in. from Taylor to Milligan Creek, 11 miles of 4-in. from Milligan Creek to West Beaten; and 4 miles of 8-in. near the Taylor station.
Status: Under way.
Contractor: Banister Construction Co., Ltd., Edmonton.
Completion: By fall 1961.

Canadian Products Pipelines

BRITAMOIL PIPE LINE CO., LTD., Box 130, Calgary, Alta.
Project: 126-mile 6-in. line from Pincher Creek to Calgary.
Status: Pending approval of the Alberta Oil and Gas Conservation Board.
Project: 64-mile 8-in. line from Dick Lake to Edmonton, Alta.
Status: Pending approval of the Alberta Oil and Gas Conservation Board.

FOOTHILLS PRODUCTS PIPE LINE LTD., (Pembina Pipe Line Co., Mannix Co., Ltd.), Calgary, Alta.
Project: 1,300 miles of 16-in. from Alberta to Chicago.
Status: Proposed.

HUGHENDEN PIPELINE.
Project: 125 miles from Dick Lake gasoline plant to underground storage in the Hughenden region of eastern Alberta.
Status: Pending approval of Alberta Oil and Gas Conservation Board.

PROVINCIAL PRODUCTS PIPELINES. LTD.
Project: 700 miles of 4 to 12-in. line to pick up propane, butane, and condensates from natural-gas plants in Alberta for delivery to refineries and other plants.
Status: Pending approval of Alberta Oil and Gas Conservation Board.

WESTALTA PRODUCTS PIPELINE, LTD., (Pembina Pipe Line, Ltd., Edmonton, Alta.).
Project: 885-mile 4 to 16-in. gathering system to take natural-gas liquids from plants in Alberta for delivery to proposed trunkline to Great Lakes area.
Status: Pending approval of Alberta Board of Public Utility Commissioners

Canadian Natural Gas Pipelines

ALBERTA GAS TRUNK LINE CO., LTD., Calgary.
Project: 226 miles of 36-in. and 125 miles of 30-in., plus laterals in southern Alberta including 58 miles of 22-in. and 64 miles of 16-in. (This is part of a 1,400-mile system to move Alberta gas to San Francisco.)
Contractors: Majestic Contractors, Ltd., Edmonton, has 113 miles of 36-in. from Crowsnest Pass to Priddis, 63 miles of 30-in. from Rocky Mountain House to Cynthia, and 38 miles of 22-in. lateral to the Rimbey region. Mannix Co., Ltd., Calgary, has 113 miles of 36-in. from Priddis to Rocky Mountain House. Dutton-Williams Brothers, Ltd., Calgary, has 62 miles of 30-in. from Cynthia to near Whitecourt, Alta., as well as a 20-mile, 22-in. lateral to the Whitecourt area. Piggott Construction, Ltd., Edmonton, has 64 miles of 16-in. lateral from Crowsnest Pass to Carway, Alta., on the U. S. border.
Completion: To be in use during the 1961-62 winter season.
Projects: The following laterals will be built in 1961 to tie in with the above mentioned 1,400-mile project from Alberta to San Francisco: 15 miles of 12-in. to Buck Lake, 23 miles of 22-in. to East Calgary, 15 miles of 16-in. to Carstairs, 4 miles of 8-in. to Sarcee, and 10 miles of 10-in. to Wildcat Hills. Other laterals to be built in the future will connect Kaybob, Berland River, Lovett River, and Stolberg.

ALBERTA NATURAL GAS CO., LTD. (Pacific Gas & Electric Co., San Francisco, and Westcoast Transmission, Calgary.)
Project: 108 miles of 36-in. from Crowsnest Pass across southeastern British Columbia to the U. S. border near Eastport, Idaho. (This is part of a 1,400-mile project to move gas from Alberta to San Francisco.)

PIPELINE CONSTRUCTION

Contractor: Price-Poole of Canada, Ltd. (Canadian Bechtel, Inc., Toronto, is engineering manager.)
Completion: The system will be in use during the 1961-62 winter season.

CANADIAN INDUSTRIAL GAS, LTD. (formerly Ajax Petroleums, Ltd.), Derrick Building, Calgary, Alta.
Project: 28 miles of 10-in. and 4 miles of 8-in. from Morinville to Westlock Viking Sand field.
Status: Planned.
Completion: By September 1961.

CARTIER GAS CORP. (St. Maurice Gas, Inc., and Consumers Gas Co., 19 Toronto St., Toronto).
Project: Transmission and distribution in eastern townships and through to Quebec City in Quebec Province.
Status: Proposed.

GAS TRUNK LINE OF BRITISH COLUMBIA, LTD., Pacific Bldg., Calgary.
Project: 245-mile, 30-in. extension of Westcoast Transmission system from Taylor, B. C., to Fort Nelson.
Status: Under way.
Completion: December 1961.

MAGNA PIPELINE CO., LTD., Nanaimo, Vancouver Island, B. C.
Project: 25 miles of 4.85-in. double flexible plastic pipe from Huntington, B. C., to Vancouver Island.
Status: Approved by British Columbia Public Utilities Commission. Tentative timetable calls for work to start by spring 1961.

NORTHERN ALBERTA PIPE LINES, LTD., Edmonton, Alta.
Project: 110-mile trunk line, plus gathering system, from Lac La Biche, in McMurray vicinity, to Edmonton.
Status: Pending provincial approval.

QUEBEC GAS TRANSMISSION LINES, INC., 1610 Sherbrooke St. W., Montreal.
Project: 300-mile line from Montreal to Quebec City.
Status: Seeking pipeline franchise from Quebec provincial government.

VAN TOR OIL & EXPLORATION CO., Vancouver, B. C.
Project: Line from British Columbia mainland to Vancouver Island.

WESTCOAST TRANSMISSION CO. LTD., Calgary.
Project: 688-mile, 30-in. loop of British Columbia-Washington line.
Status: Proposed.
Project: (See Alberta Natural Gas Co., Ltd., for joint project).

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Foreign Crude Oil Pipelines

ABU DHABIE MARINE AREAS, LTD. (partly owned by British Petroleum Co., Britannic House, Finsbury Circus, London E.C. 2).
Project: 20 miles of 18-in. from offshore Persian Gulf pool to Das Island.
Completion: 1962.

ALGERIAN LINE.
★ Project: 75-mile 10-in. line to link the new oil field, El Gassi-El Agreb, with the existing Hassi Messaoud-Bougie line. SNPA is field operator.
Status: Planned.

ARAB PIPELINE.
Project: 1,250-mile pipeline from the Persian Gulf to Mediterranean.
Status: Proposed by Saudi Arabian Government and approved by the Arab League's petroleum department.

BARNABO GROUP (Italian interests).
Project: A line from Venice, Italy, to Innsbruck, Austria, which could then be extended to Munich, Germany.

BASRAH PETROLEUM CO., LTD., 214 Oxford Circus, London, W.I.
Project: 26 miles of dual 32-in. offshore loading terminal at Fao, Iraq.
Contractor: Collins Construction Co., Port Lavaca, Tex.
Completion: Early 1961.

COUNCIL FOR MUTUAL ECONOMIC AID (Comecon).
Project: 2,800-mile system from the Volga-Ural oil fields in Russia to East Europe satellite countries.
Status: Construction under way in Poland, Hungary, and Czechoslovakia. Construction in Russia to start soon. First shipment of crude to reach Bratislava, Czechoslovakia, October 1961. By 1965, Comecon system will be supplying about 300,000 bbl. daily to above-mentioned satellites and East Germany.

CREOLE PETROLEUM CORP., Caracas.
Project: About 14 miles of 8 to 24-in. gathering line in Lake Maracaibo.

ENI (Italian state oil agency) and **ITALO-SWISS FINANCE CO.**
Project: A 700-mile system from Genoa to Aigle, Switzerland, thence northeast to the German border, where it would split with one branch going to Munich and another branch to the Karlsruhe area. Feeder lines would go to Turin, Milan, and Cremona, Italy.
Status: The trunk line from Genoa to Aigle approved by the Italian Government.

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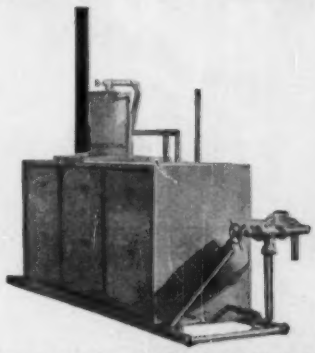

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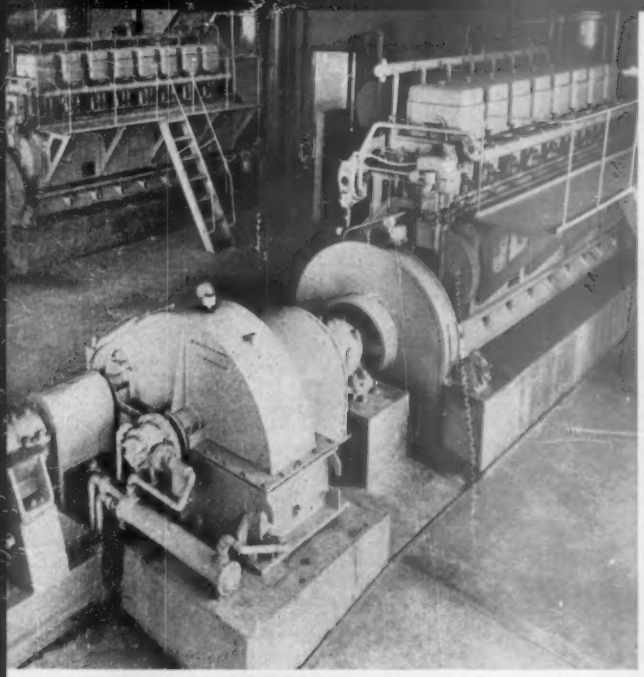

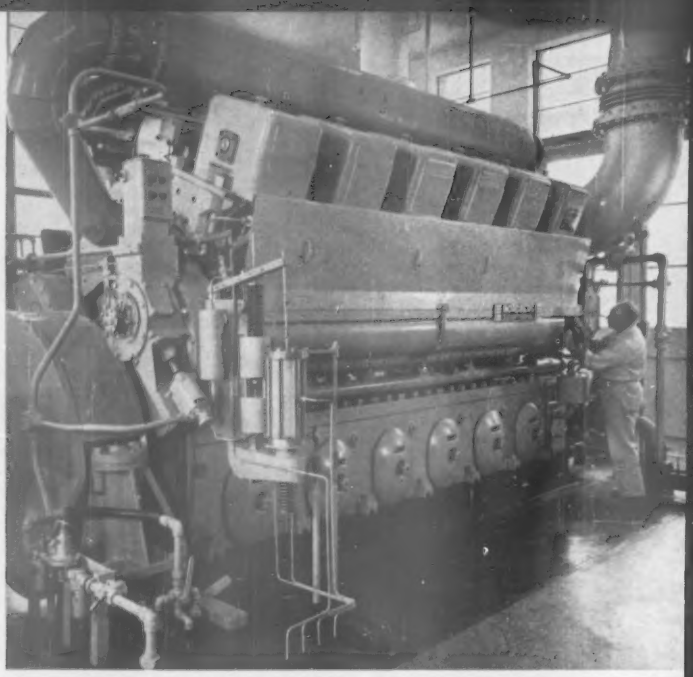

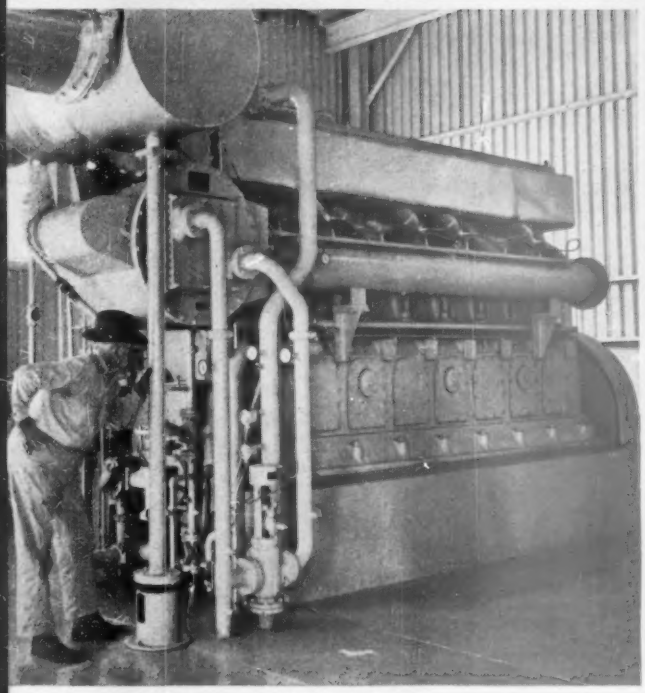

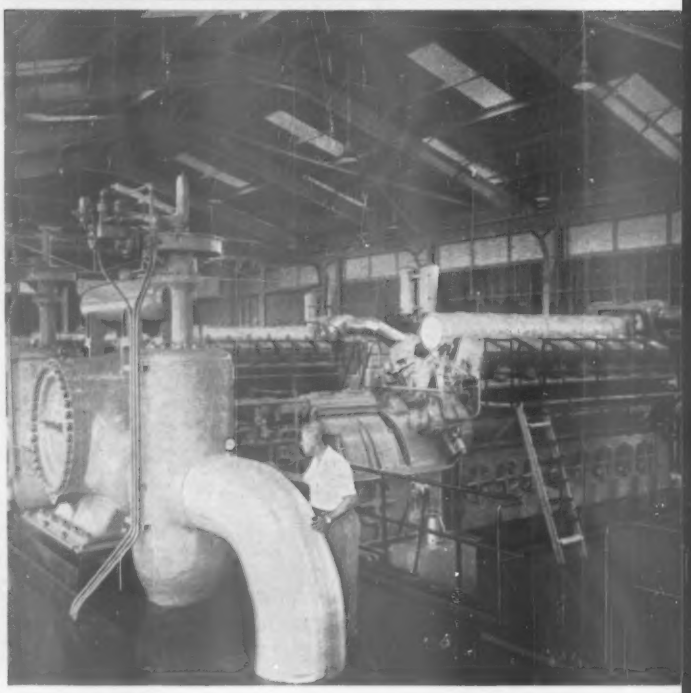

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PIPELINE CONSTRUCTION

ENI (Italian state oil agency).
★ Project: Line from Trieste to Ingolstadt, Bavaria, with possible branch from Carnic in western Austria, to Vienna.
Status: Being discussed.

ESSO STANDARD (LIBYA), INC.
Project: 100 miles of 30-in. from Zelten field to Gulf of Sirte.
Status: Under way.
Contractor: Arabian Bechtel Corp.
Completion: Mid-1961.

GERMAN LINE planned by eight German refining and marketing companies (British Petroleum, Esso, Deutsche Erdoel, Shell, Gelsenberg-Benzin, Mobil, Schloven-Chemie, and Wintershall).
Project: 155-mile, 24-in. line to Bavaria from Karlsruhe which is the northern terminus of the big South European Pipeline Co. project from Marseille to Germany.
Status: Planned.

IRANIAN OIL EXPLORATION & PRODUCING CO.
Project: 30 miles of 20-in. and 22 miles of 16-in. looping of Agha Jari to Bander Mashur line.
Status: Planned.

IRAQ PETROLEUM CO., LTD., 214 Oxford St., London W 1.
★ Project: Looping of Kirkuk-Mediterranean system is under way on a 66-mile stretch between K-1 and K-2 stations and on an 81-mile stretch between K-3 towards the Syrian border. In Syria, a 28-mile section of 30-in. is under way.

MENE GRANDE OIL CO., Apartado 709, Caracas.
★ Project: 16-in. line at Block 11, Maracaibo.
Completion: December 1961.

OASIS OIL CO. OF LIBYA, 539 South Main St., Findlay, Ohio. (Other participants are Esso Sirte and Libyan American Oil Co.).
Project: 86 miles of 30-in. from the Dahra area of Libya to El Sider on the Mediterranean Coast, and 36 miles of 20-in. feeder line from the Mabruk area to the 30-in. line.
Status: Pending approval of the Libyan Petroleum Commission and the provincial government of Tripolitania.

OIL INDIA, LTD. (Burmah Oil Co. and Assam Oil Co., two-thirds, and India Government, one-third).
Project: 720 miles of line in northeast India. This will include 250 miles of 16-in. from Nahorkatiya to Noonmati and 470 miles of 14-in. from Noonmati to Barauni.
Contractors: Mannesmann, a German firm, will lay the 260-mile 16-in. system. Contract for the 460-mile 14-in line has been awarded to an Italian Government company.
Status: Under way.
Completion: The 16-in. system is scheduled for completion in March 1962.

PETROLEO BRASILEIRO S.A. (Brazil).
Project: 250-mile line from Rio de Janeiro to Belo Horizonte refinery site.
Status: Under consideration.,
Project: 35 miles of 8 to 12-in. pipe from Buracica to Candeia.
Contractor: Techint, Inc., Milan, Italy.
Project: 80 miles of 24-in. to tie in to proposed Caxias refinery near Rio de Janeiro.
Status: Planned.

ROYAL DUTCH-SHELL.
Project: 12-mile line from Gore Bay, Australia, to Royal Dutch-Shell's Clyde refinery.
Status: Planned.
Project: 161 miles 20-in. line from Tandzung field to Balikpapan refinery, Borneo.
Status: Planned.
Contractor: Williams Brothers Overseas, Ltd., Tulsa, and John Brown, Ltd., London.
Completion: January 1, 1962.

SOUTH EUROPEAN PIPELINE CO. (Jersey Standard, Caltex, Shell, British Petroleum, and 12 other firms.)
Project: 419 mile 30-in. line from Lavera, near Marseille, to Strasbourg, with 40 mile extension to Karlsruhe, Germany This may be extended into lower Batavia with a 155-mile, 22-in. segment.
Status: Under way.
Completion: 1963.

SYRIAN PIPELINE, Damascus.
Project: 500-mile line from Karshuk field Syria, to Mediterranean.
Status: Proposed.

UNION OF SOVIET SOCIALIST REPUBLICS.
Project: 2,315 miles of 28-in. Trans-Siberian crude-products line from Ufa and Tuimazy fields in Bashkiria to Irkutsk.
Status: Under way.
(See Council for Mutual Economic Aid for information on new East Europe line.)

YACIMIENTOS PETROLIFEROS FISCALES (Argentina), Buenos Aires.
Project: 390 miles of 14-in. from fields in Neuquen Province, Argentina, to Bahia Blanca.
Status: Under way.
Project: 625 miles of 12-in. from Mendoza to San Lorenzo.
Status: Planned.

Foreign Products Pipelines

ARABIAN AMERICAN OIL CO., Dhahran, Saudi Arabia, and 505 Park Avenue, New York.
Project: 37 miles of 8-in. LPG line from Abqaik to 'Ain Dar.
Contractor: Aramco-Bechtel.
Completion: 1961.
★ Projects: 600-mile line across northern India from Barauni to Delhi via Kanpur, Lucknow, and Allahabad; 300-mile combination crude and products line from Bombay to Bhusaval; 120-mile products line from Bombay to Poona to be extended 300 miles, later, to Hyderabad; and a 350-mile products line from Cochin to Madras via Bangalore.
Status: Proposed. Recommendation has been made to start work on three of the systems immediately, with completion in 5 years. The fourth system would be started in 1963. Which might be built first was not disclosed.

NATIONAL IRANIAN OIL CO., Teheran
Project: 520 miles of 8-in. from Rey to Meshed, Iran.
Status: Under way.
Contractor: Williams Brothers, Tulsa.

NORTH ATLANTIC TREATY ORGANIZATION (Bid details from Bureau of Foreign Commerce, U. S. Department of Commerce, Washington).
Project: 57 miles of 8-in. in Germany to Land Baden-Wuerttemberg air field.
Project: 93 miles of 6-in. in Turkey.

PETROLEOS MEXICANOS, Avenida Juarez 92-94, Mexico City.
★ Project: 500-mile line from Minatitlan to Mexico City.
Status: Planned, with construction to start in 1961.
Completion: 12 to 18 months after construction starts.
Project: 270 miles of 8-in. from Torreon to Chihuahua.
Status: Under way.

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PIPELINE CONSTRUCTION

Completion: September 1961.

PIPELINES OF PUERTO RICO, San Juan.
Project: 95 miles 8-in. from Penuelas to Catano.
Status: Approved by Puerto Rican Public Service Commission.

SYRIAN PIPELINE.
Project: About 310 miles from Homs to tank farms in the Damascus, Aleppo, and Latakia areas.

UNION OF SOVIET SOCIALIST REPUBLICS.
Project: 2,315 miles of 29-in. Trans-Siberian crude-products line from Ufa and Tuimazy fields in Bashkiria to Irkutsk.
Status: Under way.
Project: 700 miles from Novo-Kuibyshev refinery to Bryansk.
Status: Under way.

YACIMIENTOS PETROLIFEROS FISCALES (Argentina), Buenos Aires.
Project: 652 miles of 10-in. from Lujan de Cuyo to Buenos Aires.
Status: Planned.

Foreign Natural Gas Pipelines

BASRAH PETROLEUM CO., LTD., 214 Oxford St., Oxford Circus, London W. 1, England.
Projects: 65 miles of 12 to 16-in. line from Zubair to Fao, Iraq
Contractor: Mothercat Co., Ltd., Beirut, Lebanon.
Completion: April 1961 for line to Fao.

GASES NATURALES DE COLOMBIA, S.A. (Owned 50% by Colombian Petroleum Co., which is affiliated with Mobil International and Texaco, and 50% by local interest.)
Project: 140 miles of 10-in. from Cicuco field to the Caribbean port of Barranquilla.
Completion: Late 1961.

INDIA.
Project: India plans to start formal talks with Pakistan soon concerning possibility of importing natural gas from Sui field into India.
Status: Preliminary studies indicate a pipeline to Bombay might be commercially sound.

ISRAEL GOVERNMENT and private interests.
Project: 17-mile, 6-in. line from Zohar field to the Dead Sea.
Contractor: Messrss. Sol el Boneh, Ltd., Haifa.
Completion: February 1961.
★ Project: 75 miles of 16-in. to power a plant at Ashdod Yam on the Mediterranean Coast.
Status: Planned.

PAKISTAN INDUSTRIAL DEVELOPMENT CORP.
Project: 1,000-mile system to carry gas from Sui field northward from Multan to Lyallpur, Lahore, Daudkhel, Islamabad, Rawalpindi, and Wah. This would require a loop to an existing 310-mile 16-in. line from the Pakistan petroleum field to Multan.
Status: Under consideration. Technical survey has been ordered.

PAKISTAN PETROLEUM CO.
Project: 145 miles of 8-in. from Sylhet field to Daccq, East Pakistan.
Status: Proposed.

PETROLEOS MEXICANOS, Avenida Juarez 92-94, Mexico City.
Project: 485 miles of 24-in. from Cuidad Pemex to Mexico City.
Contractor: Condusa.
Status: Under way.
Completion: March 1961.
Project: 165 miles of 14-in. from Mexico City to Salamanca.
Status: Under way.
Contractor: Inde-Condusa.
Completion: March 1961.
Project: 270 miles of 12-in. from Torreon to Chihuahua.
Status: Under way.
Completion: September 1961.
Project: For proposed Texas to California line through Mexico, see Tennessee Gas listing below.

QATAR GOVERNMENT.
Project: 65 miles of 10-in. from Dukhan to Doha.
Contractor: Mothercat Co., Ltd., Beirut, Lebanon.
Completion: March 1961.

SOC. SICILIANA METANADOTTI (SOSIM). Partners include Edison Power, Italcementi, Fiat Motor, Sicilian SGES Power, Bombrini Parodi Delfino Chemical, and Montecatini.
Project: 560 miles from Hassi R'Mel gas field, Algeria, to Cape Bon, Tunisia, 77 miles across the Sicilian Channel, into northern Italy and beyond.
Status: Engineering studies under way.

SOTHRA.
Project: A 315-mile system from Hassi R'Mel gas field in Algeria to the Mediterranean Coast, including 262 miles of 24-in. trunk from Hassi R'Mel to Relizane and 20-in. from Relizane to Arzew, plus branches to Oran and Algiers.
Status: Under way.
Contractors: Groupement Entrepose-Ste. Parisienne pour l'Industrie Electrique (GREP) has contract for 200 miles from Hassi R'Mel to Tiaret. Socoman has contract for 115 miles from Tiaret to Arzew.
Completion: Spring 1961.

STANDARD-VACUUM OIL CO., New York.
Project: 60 miles of 8-in. from Radja field to Palembang, Sumatra, to supply fertilizer plant planned by the government.
Status: Planned.

TEIKOKU OIL CO. and **TOKYO GAS CO.**
Project: These two companies are negotiating a proposed 200-mile, 12-in. system to move gas from Kubiki gas field in Japan.
Status: Proposed.

TENNESSEE GAS TRANSMISSION CO., Box 2511, Houston.
Project 1,100-mile, 30-in. line from Reynosa, near the southern tip of Texas, across Mexico to San Luis Rio Colorado, near the California border.
Status: Agreement signed by Petroleos Mexicanos and Tennessee Gas Transmission. Pemex would own the Mexican portion of the system. (For details see Tennessee Gas Transmission listing, under U. S. Natural Gas Pipelines.)

UNION OF SOVIET SOCIALIST REPUBLICS.
Project: New line from gas fields in western Ukraine to the Polish border.
Status: USSR has signed agreement with Poland.
Project: 250-mile line from Ust-Vilyuisk field to the Siberian cities of Yakutsk and Pokrovsk, plus feeder lines to supply villages in the Lena River Valley.
Status: Planned.
Completion: Date not set yet.
Project: Two parallel, 40-in. lines, each over 1,300 miles long, from Gazli, near Bukhara, northward to Sverdlovsk and Chelyabinsk.
Status: Planned.
Project: Line from Samarkand through Tashkent to Chimkent, Dzhambul, Frunze and Alma-Ata near Chinese border.
Completion: Line from Samarkand to Tashkent expected to be finished in 1960. Completion of rest of line expected by 1965.
Project: Line from Berezovo field southward to Sverdlovsk.
Status: Proposed.
Project: 438 miles from Dashava in Carpathian Mountains to Minsk.
Status: Under way.
Completion: 1960.
Project: Line from Minsk northward to Baltic Sea area.
Completion: To Vilnius, Lithuania, in 1961; to Riga, Latvia, in 1962.
Project: Line from Minsk northeast to Leningrad.
Status: Proposed.
Project: 800-mile, 32-in. loop of existing line from Stavropol fields in northern Caucasus to Moscow.
Status: Under way.
Completion: 1960.
Project: 800-mile, 40-in. line from Krasnodar fields north of Caucasus Mountains to Serpukhov, south of Moscow, via Rostov and Lugansk.
Status: Under way.
Project: 310 miles of 32-in. line ringing Moscow at radius of about 50 miles.
Status: Under way.
Completion: 1962.

YACIMIENTOS PETROLIFEROS FISCALES (Argentina), Buenos Aires.
Project: 1,050-mile line from Comodoro Rivadavia to Buenos Aires with a spur to Plaza Huincul field in Neuquen province. Line will be 26 in. to the connecting point for the Plaza Huincul link and 30 in. from the connection to Buenos Aires.
Status: Proposed.

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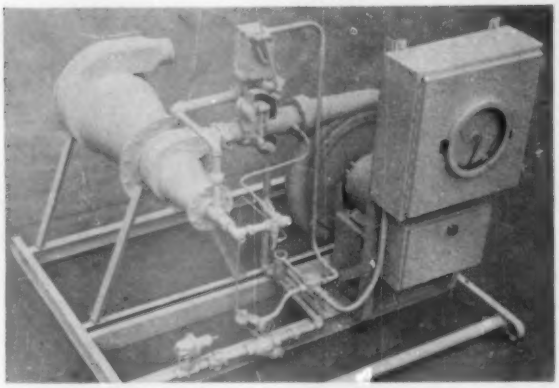
The Oil and Gas Journal

Box 1260 Tulsa, Okla.

▶ ▶ ▶ New Equipment Section

This week's SHOWCASE features . . .



Packaged air heater

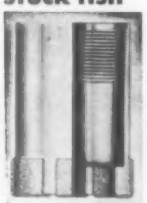
. . . a direct-fired type, has been developed for such uses as heating process air for fluidized bed dryers or spray dryers, direct heating of furnaces, and indirect heating of process fluids.

The Q-Pak heater uses a high-intensity mixer in which combustion air is brought tangentially into an annular space around a combustion chamber. This produces a cooling effect and enables the Uniflux fuel reactor to be constructed entirely of metal.

A vortex created inside the reactor causes rapid recirculation and intimate mixing of the reacting combustibles and combustion air. According to the maker, this results in essentially complete combustion within the primary reactor.

The heater is available in sizes from 100,000 to 10,000,000-B.t.u. per hour heat release. Source: **Black, Sivalls & Bryson, 7500 E. 12th St., Kansas City 26, Mo., U.S.A.**

Tool for milling up stuck fish



. . . now available serves as an accessory to the maker's junk basket. It is claimed to provide fast, dependable recovery of all loose pieces in the hole and to be ideal for milling a variety of junk. The Globaloy mill shoe comprises sintered tungsten carbide particles applied to the mill shoe by a binding process that suspends the particles in a tough matrix. Source: **Globe Oil Tools Co., 11630 Burke, Los Nietos, Calif., U.S.A.**

●

Portable pump-jack base

. . . can be obtained to save time when you install an oil-well pump jack on location. The base is mass-produced of steel-reinforced concrete to fit pumps of all American manufacturers.

The maker says the bases can be transported to location, set, and the pumps mounted on the bases in a few hours. The base is portable and can be reused at other locations. Source: **Ruthco Mfg. Co., Andrews, Tex., U.S.A.**

Spherical shaped catalyst

. . . developed for catalytic cracking. According to the maker, the Filtrol Grade 120 catalyst can be used in several commercial moving-bed catalytic cracking units, of both Houdry and Socony design. The catalyst is said be be truly spherical, and uniform in size. Source: **Filtrol Corp., 3250 E. Washington Blvd., Los Angeles 23, Calif., U.S.A.**

●

Hydrogen-treating catalyst

. . . has been developed which, the maker says, shows markedly increased nitrogen and polyaromatics removal over cobalt-molybdenum catalyst compositions. Tradenamed Aero HDS-3, the catalyst is reported to be particularly well adapted for giving improved color to waxes, treatment of nitrogen-containing naphthas, or hydrogenation of catalyic cracker feedstocks and middle distillates. Source: **American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y., U.S.A.**

●

New grout material

. . . for compressors and other heavy equipment resting on foundations is claimed to prevent foundation failures and resulting damage. The product, No. 648 grout, has a resin base compounded to give a high-strength foundation which, the maker claims, is virtually impermeable to oil, most acids, and alkalis. Source: **Ceilcote Co., 4832 Ridge Rd., Cleveland 9, Ohio, U.S.A.**

●

Arc-welding generator set

. . . available in England is designed to withstand the inherent vibration of diesel-engine drive and to meet the

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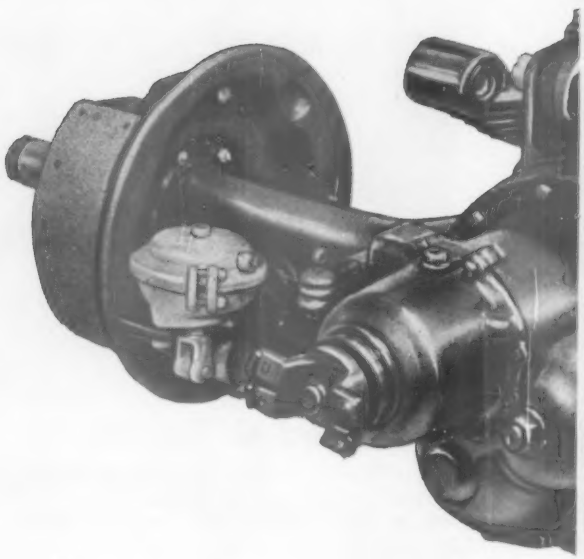
Hours of twist tests and road tests proved the quality and endurance of new IH bogies.



Now!
INTERNATIONAL Six-Wheel Trucks offer

NEW TANDEM DESIGNED AND

give you greater load capacity, more savings

Lightweight, simplified power divider – Through-drive hypoid design transmits equal driving force from triple helical gears to forward axle and then through drive shaft to rear axle. Both drive pinions rotate in a 1-to-1 ratio.

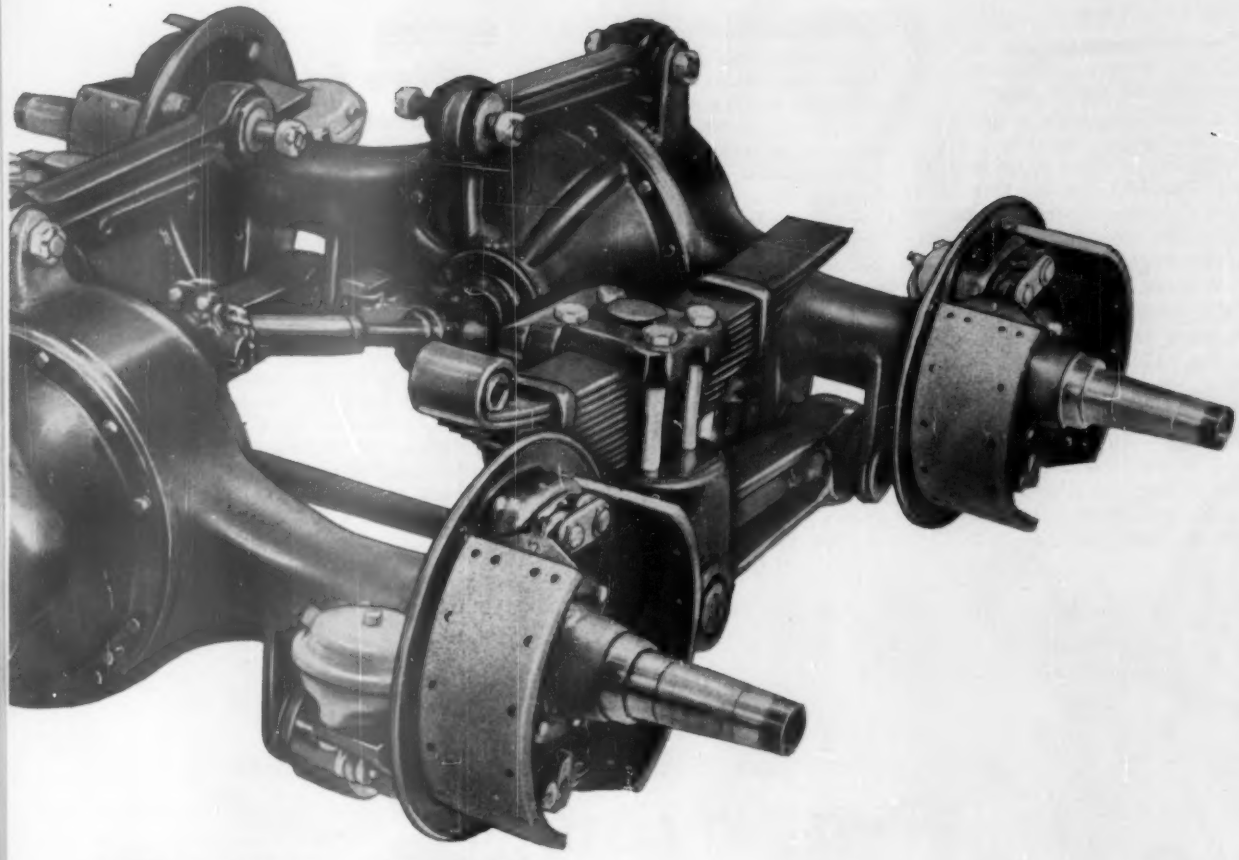
Induction-hardened axle shafts—Induction heating provides a hard, deep outer case and maintains a tough inner core for up to 10 times more resistance to shock loads. Axle shafts will not "fan-out"—they cut the possibility of fragments in the differential or axle housing.

Rugged, lightweight, through-drive design—Handles bigger payloads with less wear and tear. Provides greater strength and increased torque capacity. You work better both on and off highway, at high or low speeds.

Clean-cut appearance – Differential carriers are centered, all drive parts are kept within diameter of housing banjo. Brake diaphragms are in protected areas. Shafts and other parts interchangeable between axles.

Now three IH bogies available – Weight ratings of 30,000, 34,000 and 38,000 lb. capacities. Available in INTERNATIONAL Trucks of conventional, compact, and cab-over-engine designs from 37,000 to 53,000 lbs. GVW, up to 127,000 lbs. GCW, with gasoline, diesel or LPG power.

IH Built, IH Serviced, IH Warranted – Built by the makers of the most complete line of trucks—sales leader in six-wheel trucks for 25 straight years. Service availability nationwide. Performance warranted for 100,000 miles.



AXLES BUILT BY IH

in weight, backed by a 100,000 mile warranty!

Puts the stopper on costly "down time."

Built to carry men and gear everywhere.

Top weight distribution and flotation.

INTERNATIONAL® TRUCKS WORLD'S MOST COMPLETE LINE IH®

International Harvester Company, Chicago • Motor Trucks • Crawler Tractors • Construction Equipment • McCormick® Farm Equipment and Farmall® Tractors

exacting requirements of welding in any climatic condition and on sites where little skilled maintenance help is available, the maker reports.

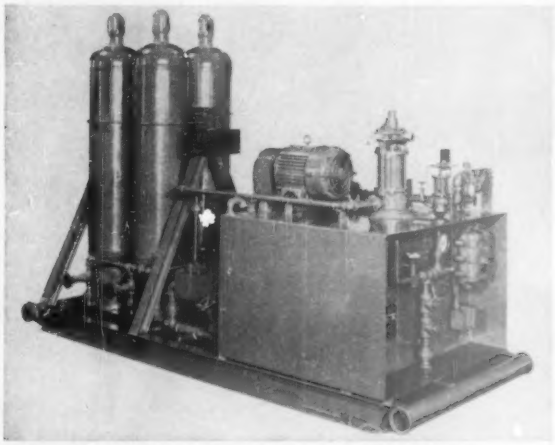
The main component is fabricated from mild steel in the form of two welded barrels. These are bolted together. The field coils are detachable without removing the armature or dismantling the complete case.

A centrifugal fan cools the generator. It draws air from the drive end past the commutator and field coils. The maker reports the field system provides continuous current adjustment between minimum and maximum at a nearly constant open-circuit voltage. Two large handwheels control welding current and voltage. Rating of the unit is about 8 kw. at 65 volts d.c. Source: **Petbow Ltd., Sandwich, Kent, England.**

Corrosion-control system

. . . is to be available soon. Based on anodic passivation, the system was developed by Continental Oil Co. Initially, it will be offered for control of corrosion in sulfuric acid storage.

The Anotrol system is designed to improve the quality of stored acids and end products by removal of metal contaminants. It is said to make stainless and mild-steel containers resistant to such corrosive chemicals as sulfuric, phosphoric, and nitric acids, and a variety of strong caustics by electrically depositing and maintaining a protective film on metal surfaces. This promises to permit substantial savings in capital-investment costs through use of less-expensive materials in construction of tanks. Source: **Minneapolis-Honeywell Regulator Co., Rubicon Div., Ridge Ave., at 35th, Philadelphia 32, Pa., U.S.A.**



Blowout-preventer control unit

. . . has been brought out that uses electric and air pumps simultaneously to reduce charging time to about 6 minutes, one-half the time required when air or electric pumps are used individually, according to the maker.

The system is claimed to offer dual sources of power for safe and efficient operation under the most hazardous blowout conditions. The unit includes an 88-gal. accumulator system that comprises four 22-gal. hydropneumatic accumulators. The Koomey Airlectric automatic-pump accumulator system is available in guided-float or bladder type, with explosionproof motor and starter, and automatic controls. Source: **Stewart and Stevenson Distributing Co., 1719 Preston Ave., Houston 1, Tex., U.S.A.**

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SHOWCASE . . .

New Equipment

Help for oil-base mud users

. . . is provided by a new filtration control agent called Duratone. The product is a synthetic organophilic colloid in dry powder form for use as a filtration-control agent for oil-base drilling mud systems that contain water.

The water may be present as a contaminant in concentrations as low as 5 to 10% by volume, or as a component of an oil-base emulsion mud, the maker says. The product is said to control filtration rates at temperatures above 250° F. as well as at lower temperatures. Source: **Baroid Div., National Lead Co., P. O. Box 1675, Houston, Tex., U.S.A.**

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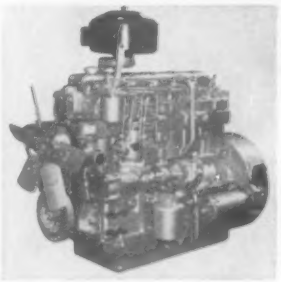

Direct-injection diesel engine

. . . developed in England is expected to prove useful for powering a variety of equipment, both mobile and stationary. The Model Six 354 engine is rated at 112 b.hp. at 2,800 r.p.m.

The combustion chambers are toroidal-shaped bowls formed in the top of the pistons and sightly offset from center. Fuel is injected directly into the cylinders through multihole atomisers.

Specifications include: 354-cu.-in. displacement, weight without accessories of 836 lb., and maximum torque at 1,300 r.p.m. of 234 lb.-ft. Source: **Perkins Engines, Ltd., Northants, England.**

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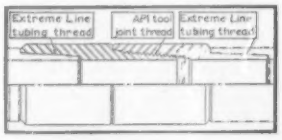

New tool joints

. . . for Extreme Line tubing are available. They are designed for use in workover, completion, and deepening jobs.

The rotary connection is the standard API internal flush box and pin.

This type of connection is said to insure interchangeability, particularly where subs and other API connections are used.

The maker cites several advantages for the tool joints: Round-trip time can be shortened, the joints take the hammer-and-tong wear, and the rotary threads take the make-and-break wear.

The design is said to provide a sealed joint that is shoulder tight. The tubing tool joints offer a way to eliminate the time and expense of hauling a special string of drill pipe to a well site, as well as the expense of an additional string of drill pipe.

The tubing tool joints are made in three sizes: 2⅜, 2⅞, and 3½ in. Source: **National Supply Co., 2 Gateway Center, Pittsburgh 22, Pa., U.S.A.**

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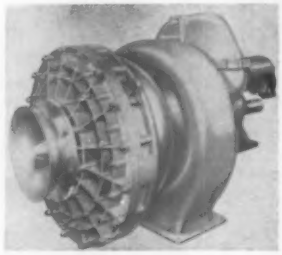

400-hp. gas turbine

. . . recently developed incorporates a centrifugal compressor, annular combustor, two-stage turbine section, and an integral speed-reducing gear case. It is a free-shaft engine that develops the 400-hp. rating at output shaft speeds of 2,500 or 3,600 r.p.m.

Other design features of the turbine include a compressor speed of 36,800 r.p.m., power turbine speed of 25,270 r.p.m., engine length of 50 in., engine width over exhaust collector of 28 in., and engine weight of 620 lb. (including the fuel pump and control, but not including the starter-generator). Source: **Waukesha Motor Co., Waukesha, Wis., U.S.A.**

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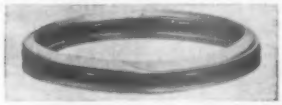
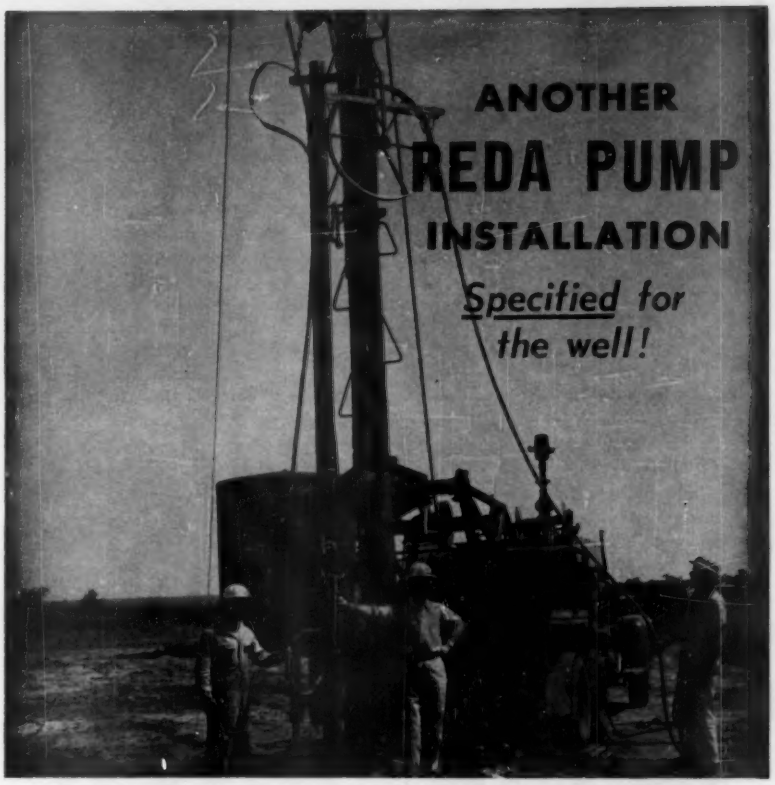


Seal holds high pressures

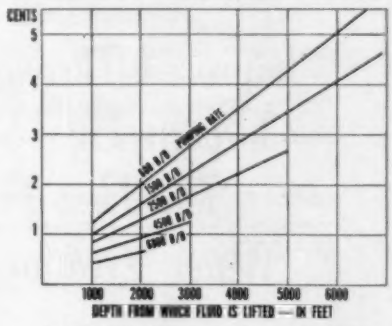
. . . and is claimed to seal off large differential pressures in applications in which conventional O-ring seals extrude and fail. The seal-ring assembly has been used in applications which required sealing off differential pressures exceeding 50,000 psi., the maker reports. It can be obtained for diameters from ¼ in. in many feet. Source: **Bowen Itco, Inc., P. O. Box 4587, Houston 13, Tex., U.S.A.**



REDA Does the Job Better and at LOWER COST

Billions of barrels of fluid (oil and water) have been produced at an average lifting cost of less than one cent per barrel for each 1,000 foot lift. Chart "A" illustrates average lifting cost from 600 B/D to 6,000 B/D using Reda Submergible Pumps.

Most complete submergible pump line for producing oil wells, water supply wells, brine wells, etc. Sizes range from 5 to over 240 h.p. . . . models for wells cased with 4", 5½", 6⅝", 7" or 9⅝" casing . . . for depths from 500 to 10,000 feet, and for capacities of 100 bbl. to over 18,000 bbl. per day.



*Included: Electric Energy (10 Mills Per KWH), Run and Pull, Repairs, Upkeep, Transportation, Labor and Amortization (8 Yrs.)

Chart "A"

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Manufacturers of Submergible Electric Motors & Pumps for over 40 years
Pumps for Oil, Brine, Water, Gasoline, Jet Fuel, Chemicals, LPG

SIGN OF QUALITY SUBMERGIBLE REDA PUMPS

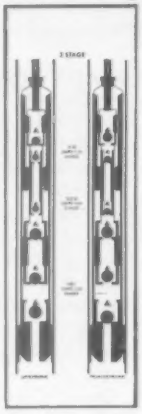
Newest telemetering system

. . . disclosed uses the high speed inherent in solid-state electronics to permit three basic functions to be effectively accomplished over one low-grade communications link, the maker says.

The three basic functions are: (1) data gathering, (2) constant alarm scanning, and (3) control. Time-sharing techniques are used to avoid the need for more-costly multichannel systems. According to the maker, this design makes possible a practical large-scale continuous alarm scan.

The system is designated RATE, for remote automatic telemetering equipment. The system serves up to 1,200 points and provides for two-condition control operations plus set-point control. It is designed to be compatible with on-line computer control systems. Source: **Shand & Jurs Co., 2600 8th St., Berkeley 10, Calif., U.S.A.**

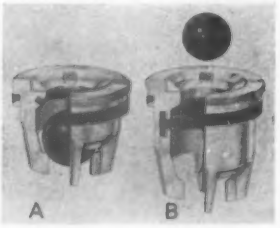
Three-stage oil-well pump



. . . has been developed for producing high gas-oil-ratio wells. According to the manufacturer, the pump has been highly successful in producing wells where gas lock may have prevented normal pump operation.

The lower two-thirds of the pump contains the first and second stages. The third stage provides a higher compression ratio than is possible with the maker's two-stage pump. It also provides a means of building in a good compression ratio at the bottom of the stroke for the first and third stages.

Compression can be controlled by selection of component-part lengths so that, at the bottom of the stroke, there is a minimum of volume in both the first and third stages. Source: **Axelson Div. of U. S. Industries, Inc., 6160 Boyle, Los Angeles 58, Calif., U.S.A.**



Valves for cementing

. . . are expected to provide improved sealing and controlled casing fill. The valves are installed in casing couplings between the pin ends of madeup joints. The maker says they provide an economical substitute for conventional floating and fillup collars in cementing programs with moderate-depth requirements.

The insert float-check valve shown on the left uses a "floating ball" as a back-pressure valve.

The insert Flexifill valve (B) incorporates an automatic flow-control diaphragm. During running-in, this variable orifice gives relief from pressure surges and prevents overflow of casing, according to the maker. After circulation, a bakelite ball is pumped through this orifice to act as a back-pressure valve for the cementing operation. Source: **Baker Oil Tools, Inc., P. O. Box 2274, Terminal Annex, Los Angeles 54, Calif., U.S.A.**

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GLUCOSATES*

Improved Through Research
Proven By Performance
The Best For Your
Water Treating Problems

Write for literature on your letterhead.

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San Antonio 21, Texas

AT COSDEN . . .

After five years' experience in operating Combin-aires, Cosden Petroleum Corporation, at its Big Spring refinery, has installed its FOURTH Hudson Combin-aire.

The Combin-aire is an integrated structure combining a water cooling tower with fin-tube hot fluid to air exchangers. Ambient air is cooled as it is drawn thru the water, and the cooled air serves as the cooling medium for the fin-tube coolers. Thus, with fin-tube coolers, effluent process stream temperatures may be reduced far below those obtained with ambient air.

The Combin-aire may be used primarily as a cooling tower, with the advantages of double use of air, and, because hot effluent air is undersaturated, complete elimination of spray carry over or condensation. Or when water is scarce, or salt, or brackish the Combin-aire may be used primarily for fin-tube cooling, using minimum water of any quality for pre-cooling air.

DEPENDING UPON DESIGN OBJECTIVES THE COMBIN-AIRE MAY HAVE SOME OR ALL OF THE FOLLOWING ADVANTAGES:

- Absolute minimum water consumption consistent with attainment of low terminal process stream temperatures.
- Water circulation may be made automatically responsive to air temperatures with no water circulated except at high ambient temperature.
- No water treatment necessary. Salt water or brackish water may be used.
- No spray carryover or condensation. After passing across the fin-tube elements the heated air leaving the Combin-aire at elevated temperature is undersaturated with water vapor and cannot precipitate condensate or carry water spray.
- Minimum piping. Combin-aire may be installed immediately adjacent to other process equipment.
- Clean air to fin-tube units. During the hot season air is washed, removing dust, sand and insects.

Effluent temperatures of process streams may be accurately controlled with HUDSON Auto-variable pitch fans.

HUDSON

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SWANSEA HARBOUR SOUTH WALES

This ingenious new fire-fighting float, the "BP Firemaster", was designed by BP. It can deliver 3,100 gallons of water a minute at a pressure of 100 pounds per square inch, or alternatively 12,500 gallons of foam a minute.

BP

SHOWCASE . . .

New Literature

Recorders and indicators

. . . are outlined in new 48-page Catalog C 15-1a which highlights new modular design features, the quick-changing 2 to 24-point ElectroniK universal multipoint recorder, and other strip and circular-chart recorders and precision indicators. Source: **Industrial Div., Minneapolis - Honeywell Regulator Co., Wayne and Windrim Aves., Philadelphia 44, Pa., U.S.A.**

76-page engineering-design manual

. . . offers a compiled listing of materials and specifications, recommended application, and the latest technique for mounting tubing, wiring, and similar materials. Bulletin 212 G includes a description of clamps, brackets, shims, and line supports for various applications. Source: **TA Mfg. Co., 4607 Alger St., Los Angeles 39, Calif., U.S.A.**

Fluid for completing wells

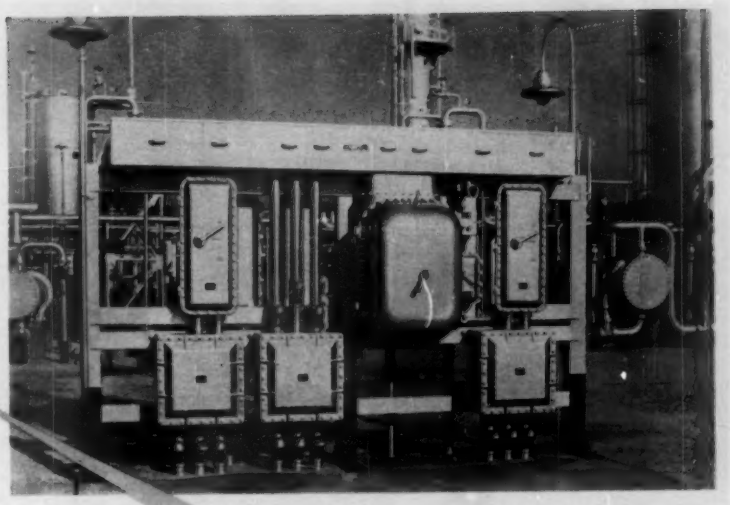
. . . and filling the annulus between casing and tubing, known as Heviwater, is the topic of a newly published development bulletin now available. The 22-page literature contains chapters on descriptions, advantages, applications, effects of temperature, pH of Heviwater, corrosion, compositions of various solutions, and case histories. Photos and graphs are included. Source: **Dowell Division of The Dow Chemical Co., Box 536, Tulsa, Okla., U.S.A.**

New computer service

. . . for piping flexibility is discussed in a 12-page booklet recently announced. Using a simplified do-it-yourself input feature, the service is said to provide an analysis within 24 hours. The publication outlines a step-by-step report on the analysis of a three-anchor system and two two-anchor systems. Source: **Service Bureau Corp., 425 Park Ave., New York 22, N. Y., U.S.A.**

Cost-engineering practices

. . . publication discusses basic factors to be considered in cost engineering of capital equipment for the process industries, and points out the importance of efficient, long-range forecasting of total costs, including operation and maintenance. The 16-page booklet—Cost Engineering is the Key to the Economic Evaluation of Heat Exchangers—contains seven charts which show the cost per square foot of various types of heat exchangers. Source: **Heat Exchanger Div., Western**



296*

*296 — *that's the number of switchracks* made by Nelson the last four years. A Nelson switchrack is the simple, sure way to save important money on an outdoor assembly of electrical control components. Nelson makes them explosion-proof or water-tight and dust-tight, all with conduit factory formed and assembled, and with all wiring and cable runs installed.** 97% of our switchrack customers come back for additional units when in expansion or modernization programs.

What better evidence of complete satisfaction could be desired?

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BIG ENOUGH TO PERFORM
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Be sure to let your Nelson representative figure your next job. You will find him listed in the Yellow Pages of major city telephone directories.

** *Ask your Nelson man for the facts on some of these installations.*

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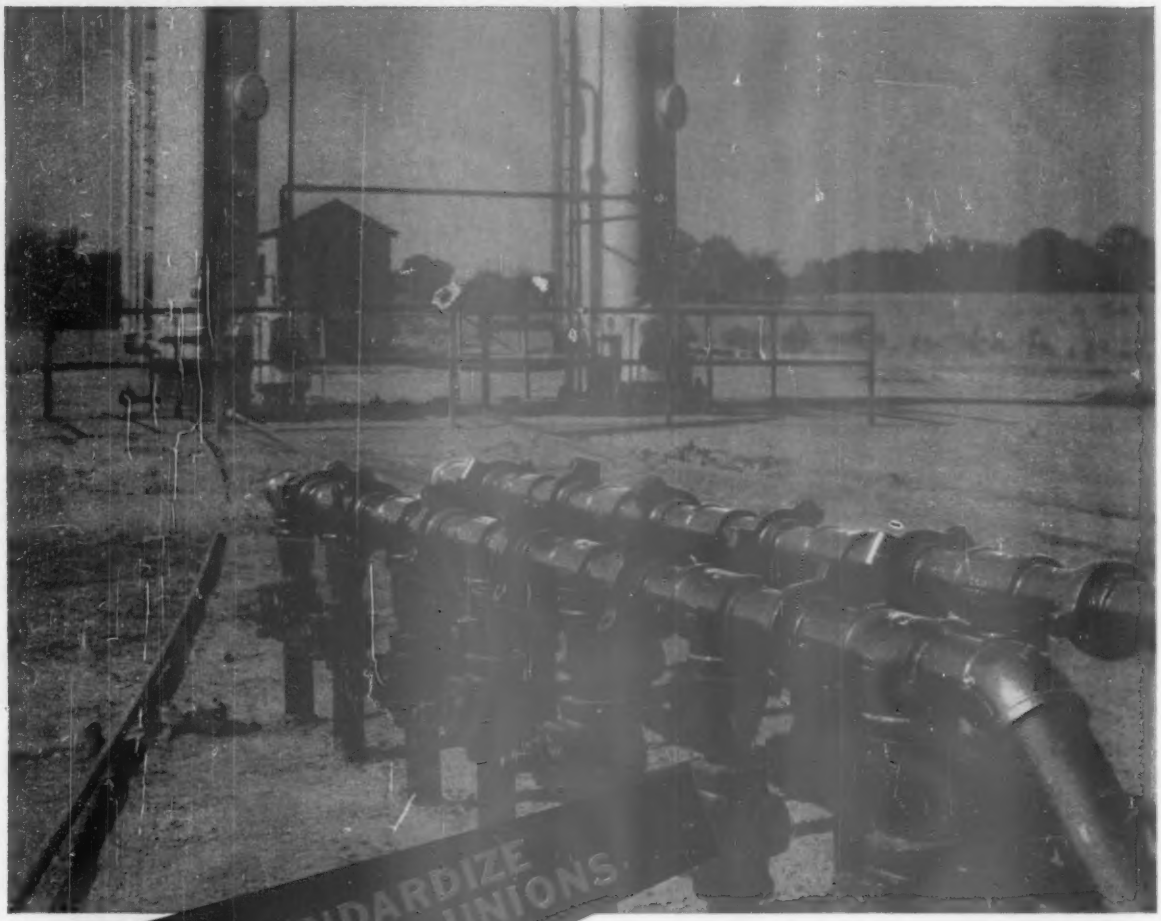

the key to streamlined, economical production hook-ups

When laying field lines, setting tank batteries, separators, heaters, treaters, etc.—when assembling headers and manifolds, WECO Unions are your best, most dependable, leakproof connections. The ball and cone seat seals leakproof with just a few turns of the wing nut. The precision-cut pipe threads on the subs fit perfectly, run up fast and leakproof without galling or damage.

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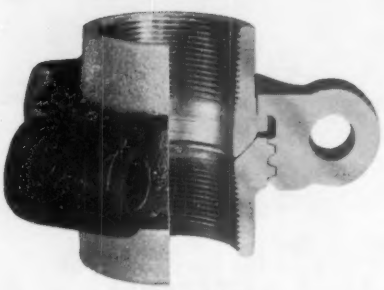
Next time and every time, specify WECO Unions, and you will soon have your standardization program complete, saving you time and money for years ahead. Talk to your WECO Representative or your Supply Store for WECO UNIONS.



WECO Fig. 100
1000 psi test
Sizes: 2" thru 8"

This popular 3 lug "Bar Nut" union is ideal for production installations. Completely interchangeable.

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Greater "Clinging" Power for Increased Thread Protection!
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Supply Co., Box 1888, Tulsa, Okla., U.S.A.

LP-gas carburetion system

. . . for butane propane is detailed in a new 42-page brochure just made obtainable. It discusses fuel controllers and fuel-control equipment; spud-ins, adjusting blocks, and filters; miscellaneous carburetion equipment; LP-gas carburetors; carburetor adapters; solenoids; switches; tank-liquid and tank-vapor withdrawal kits; repair and rebuilding kits; brackets; and both high and low-pressure hose, clamps, pipe and hose fittings. Source: **Garretson Equipment Co., Inc., Box 111, Mt. Pleasant, Iowa, U.S.A.**

Determine pumping loads

. . . with hollow sucker rods, as described in a new four-page bulletin now being offered. It notes that using hollow sucker rods in a dual role, as rods and tubing, means that present formulas load calculation must be changed to fit conditions. The bulletin offers an analysis of forces involved, and suggestions for rod-string design. Source: **Vinson Supply Co., 220 N. Boston, Tulsa 3, Okla., U.S.A.**

Tachometer Catalog 62

. . . should be of interest to anyone having problems with speed measurement, production control, or quality control. In 12 pages it contains photographs, drawings, and descriptions of 19 types of tachometers, together with drawings of various types of flexible shafts and drives and drawings of different drive arrangements. Source: **Jones Motorola Corp., 432 Fairfield Ave., Stamford, Conn.**

Lubricating plug valves

. . . are detailed in four new bulletins just announced—Service Fleet, four pages; Rolotork, eight pages; High-Strength Cast Iron, four pages; and Lubricating Manual, 12 pages. Each publication contains numerous diagrams and illustrations. Source: **Lubricated Plug Valve Div., Walworth Co., 750 Third Ave., New York 17, N. Y., U.S.A.**

Versatile construction material

. . . called "Glasteel" (strong like steel, but resists corrosion and protects like glass), is detailed in a new 20-page bulletin. It gives manufacturing steps, physical and chemical properties, and end-use of the product. A technical-data section includes a discussion of operating temperatures, thermal shock, heat transfer, testing facilities, and resistance to acids and alkalies. Source: **Pfaudler Co., 1124 West Ave., Rochester, N. Y., U.S.A.**

check the valve

that doesn't chatter
Check the Daniel Piston Controlled Check Valve for quiet efficiency in preventing flow reversal. Choose from stock in sizes and types covering a wide range of both compressible and non-compressible fluid services. Patented, free-floating piston design eliminates chattering and minimizes pulsation. Available in carbon or cast alloy steels with stainless trim, or with hard-faced internals for mud-line service. Up to 10,000 lbs. A.S.A. ratings.
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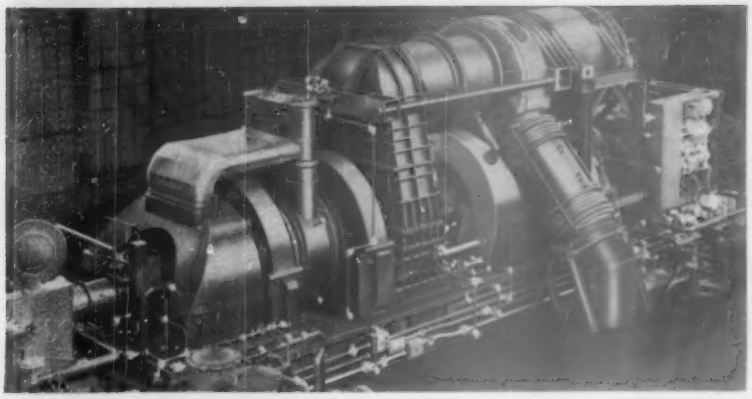
Equipment Men Notes



8,370-HP. GAS TURBINE is one of three such units being readied by Clark Bros. Co. for delivery to Trans-Canada Pipe Lines, Ltd. The two-shaft unit features a regenerative cycle which makes use of hot exhaust gases to preheat combustion air to provide over-all thermal efficiency. The turbines will power three new compressor stations in Trans-Canada's multi-million-dollar expansion program to export natural gas to the United States.

A. Campbell, Jr. is promoted

A. Campbell, Jr.

. . . to manager of sales and marketing services for Thermoid Division of H. K. Porter Co., Inc., according to G. P. Robers, Thermoid's general sales manager. Campbell, during his 23 years with the division, has served in various sales and customer-service capacities. In his new post he will head up Thermoid's new sales and marketing services department at the division sales office in Trenton, N. J.

Continental-Emsco is distributor

. . . for Fibercast Co. in the Texas Gulf Coast region on an exclusive basis. Located in Sand Springs, Okla., Fibercast is a manufacturer of reinforced epoxy-resin pipe and fittings. Both companies are divisions of Youngstown Sheet & Tube Co.

Ralph Hayes has been named industrial sales representative responsible for the development of Fibercast in that area. Formerly a galvanizing sales representative, Hayes has been with C-E since 1957. He will be headquartered in the company's Houston division office.

Stewart & Stevenson reports

. . . a shift in field personnel assignments in North and West Texas locations. Dick Brough, former operations manager at the firm's Odessa branch, has been transferred to Lubbock as manager of the sales and service facilities there. Royce Garner succeeds Brough as Odessa operations manager. Prior to this assignment, Garner served as assistant operations manager at Odessa.

Oil Well Supply Div. appoints

. . . Paul E. Pottker as manager of industrial sales for the division's Witte Engine Works; and names T. H. Scheline as district representative, Wilson-Snyder Products at Chicago. Pottker joined Witte as export manager in 1945. He was appointed assistant manager of sales in 1949, and became manager of distributor sales in 1956.

Scheline was employed by Oil Well in 1941, his first assignment being in the accounting department at Braddock, Pa. In 1951 he was shifted to the sales department as quotation specialist. He left the division in 1953, returning 2 years later in his former position.

Training for petroleum engineers

. . . on diesel-engine design is being offered by Detroit Diesel Engine Division of General Motors Corp The program covers the design, operation, and maintenance of current GM diesel models with emphasis on fuel and lubricant requirements under new and varied operating conditions.

The course, which lasts one week and is limited to 30 participants, is open to personnel engaged in product research and others responsible for the production and distribution of petroleum products. Classes are held in Detroit.

Further information and available open dates may be obtained by writing: Detroit Diesel Engine Division, Product Service Training School, 13400 West Outer Drive, Detroit 28, Mich.

William T. Cushing, Jr. becomes

W. T. Cushing, Jr.

. . . assistant manager of the London, England, office of National Supply Co.'s export division. He joined National Supply in 1940 and was engaged in engineering and sales work at Toledo and Houston. In 1947 he was appointed division engineer of the northwest and Canadian divisions, with headquarters at Casper, Wyo., rising there to division sales manager.

In 1950 Cushing was named manager of drilling-equipment sales. Since 1956 he has served as manager of industrial sales. The company has had an office in London since 1921. C. T. Reichert is manager.

Mission Mfg. Co. announces

. . . the appointment of Hugh L. Morris and Garland Kennon to its sales staff.

Morris has been with Mission since

H. L. Morris

Garland Kennon

mid-1959, serving in the firm's engineering department in Houston. The previous 5 years, he worked for Mid-Continent Supply Co. Kennon was with Industrial Nucleonics Corp. in Columbus, Ohio, and Ada Oil Co. before joining Mission.

Western Co. plans expansion

. . . which includes an international operation. The company is presently setting up operations offices in South America, and recently named Harold E. Parsons vice president in charge of the South American division. Formerly Rocky Mountain division manager, Parsons now has offices in Buenos Aires, Argentina.

Meanwhile, Western has reorganized its research and engineering operation. It is now established as a full operating division with responsibility to secure contracts outside the

company. Westco Research & Development Division, under the managership of Roscoe Clark, Western vice president, has received a number of research contracts and additional ones are being negotiated.

R. T. Watkins is area manager

. . . of machinery sales in Los Angeles for Oil Well Supply Division of U. S. Steel Corp., announces D. S. Grubbs, the division's California area manager. Watkins joined the organization in 1937 as sales engineer in Los Angeles. In 1952 he was appointed area engineer, the position he held prior to his present appointment.

Halliburton Co. transfers two

. . . division managers. W. L. (Bill) Hughes, from Midland, Tex., will assume duties as manager of the Okla-

W. L. Hughes

P. C. Mayfield

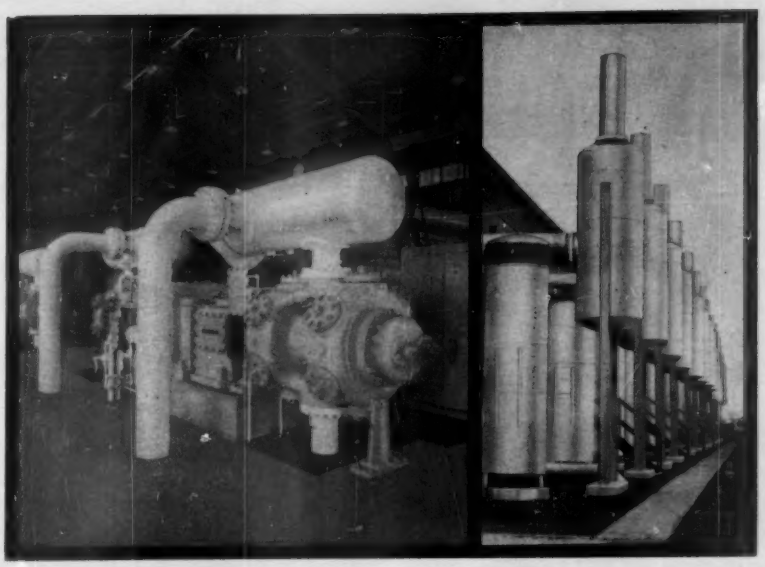
homa City division; and P. C. (Bill) Mayfield, from Oklahoma City, will take charge of the Midland division.

Hughes joined Halliburton in 1938 and was stationed in various locations in Halliburton's eastern operations. Following the war, he returned to Texas as assistant credit manager in Houston, then was promoted to assistant division manager. Hughes served in West Texas under Mayfield, then took charge of the Lubbock, Tex., division in 1955. When Mayfield moved to Oklahoma City in 1957, Hughes replaced him in Midland.

Mayfield was employed by Halliburton in 1936 at Duncan, Okla. The following year he was transferred to West Texas where he worked in various capacities for the next 15 years. He was made division manager in Midland in 1950.

Bovaird Supply Co. reelects

. . . all directors and officers of the firm at a recent annual stockholders' meeting in Tulsa. Directors are: D. D. Bovaird, president; R. G. Ayers, senior vice president; R. E. Batchelor, vice president and general manager; W. J. Bovaird, vice president of sales; T. H. Trower, secretary-treasurer; A. E. Booth, independent operator, Bradford, Pa.; B. J. Williams, partner of Williams, Boesche & McDermott; and R. M. McMahan, former secretary of the company, now retired.



ELIMINATE PULSATION AND NOISE WITH BURGESS-MANNING SNUBBERS

Burgess-Manning Pulsation Snubbers are the most effective control measures available to eliminate pulse-induced vibration. Equipment performs better, operating and maintenance costs are reduced, breakdowns and repairs are fewer, and even structural damage to buildings and foundations is prevented. Similarly, when a Burgess-Manning Silencer is installed to eliminate excessive noise, employees work more efficiently, with fewer accidents and errors, production is usually increased, and a plant's labor and community relations are improved. ■ If noise or vibration from the intake or discharge of internal combustion engines, blowers, turbines, compressors, gas or steam vent valves, pressure regulators, and similar equipment is a problem with you, contact Burgess-Manning. Nowhere in the world will you find a company better qualified, with more experience, a better engineering background, and a wider range of products for noise and pulsation attenuation. *Pictured: Burgess-Manning Pulsation Snubbers, Filter-Silencers, and Exhaust Silencers on gas-driven compressors in petroleum pipe line station.*

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Industrial Silencer Division
BURGESS-MANNING COMPANY
The Sound-Engineering People
General Offices: 9217 Sovereign Row, Dallas 7, Texas

BJ Service, Inc. promotes two

. . . to new positions in the Fort Worth offices, reports A. M. Birnie, vice

C. F. McMahan

J. L. Buster

president of the subsidiary of Borg-Warner Corp.

C. F. McMahan moves from Denver, where he has been area sales manager, to become assistant to the sales manager at Fort Worth. John L. Buster, formerly Long Beach division engineer, takes over as technical assistant to the vice president, supervising technical details of oil-well products and services for company customers.

Minneapolis-Honeywell reports

. . . four executive appointments in its Industrial Products Group. Nilsson S. Bassett, sales manager of the Industrial Systems Division in Beltsville, Md., has joined the company's Federal Services Group in Washington as group marketing liaison with government agencies.

Succeeding him as Industrial Systems Division sales manager is John O. Paull, industrial sales manager of the Pacific region in Los Angeles. He, in turn, is being succeeded by J. F. Smith, southwest regional industrial sales manager at Dallas. R. E. Harris, district manager at Tulsa, succeeds Smith.

Ralph N. Brodie Co. appoints

. . . Holt Pump & Supply Co., Oklahoma City, as meter sales representative for Brodie in 50 counties of Oklahoma. The announcement comes from E. D. Brodie, general sales manager of the San Leandro, Calif., company.

NEW AND EXPANDED QUARTERS of Schlumberger Well Surveying Corp. in Beaumont, Tex., coincide with the firm's 25th year of service in the city. Schlumberger's first office in Beaumont was opened in 1935 with a four-man crew. The present facilities are staffed with more than 30 employes and contain about 18,000 sq. ft. of office and garage space. Carter Robinson is manager of the Beaumont district which serves 17 Southeast Texas counties. Formal opening of the new quarters was celebrated recently with an open house and equipment display, attended by some 400 guests.

HILLMAN-KELLEY

POWER TONG EQUIPMENT

Hydraulic **POWER TUBING TONG***

Hydraulic **POWER CASING TONG***

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******Also available for air operation*

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Shreveport, La. • Corpus Christi, Texas • Ventura, Calif. • Bakersfield, Calif.

How C-B/S Compressor Designs Solve Your Problems in Gas Gathering

Whether your problem revolves around fine compressor balance for barge-mounted operations, remote control or split gas streams, C-B/Southern people understand your needs. Their application experience is coupled with actual oil and gas producing background. That is why they can provide you with on-the-spot suggestions to economically solve your toughest gas gathering problem. This background is enhanced by company knowledge gained in building more than 40,000 compressor horsepower last year.

C-B/Southern's experience extends through Design, Engineering and Manufacturing Departments. It reaches all the way to future service from 22 Cooper-Bessemer service offices.

A point worth remembering: C-B/S packaged compressor plants are available in horsepower ratings from 100 to 1440; unitized compressors, both reciprocating and centrifugal, to 10,500 horsepower.

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MANUFACTURERS OF PACKAGED COMPRESSOR PLANTS FOR GAS GATHERING, GAS LIFT, GAS INJECTION APPLICATIONS

CORROSION?

CORBAN

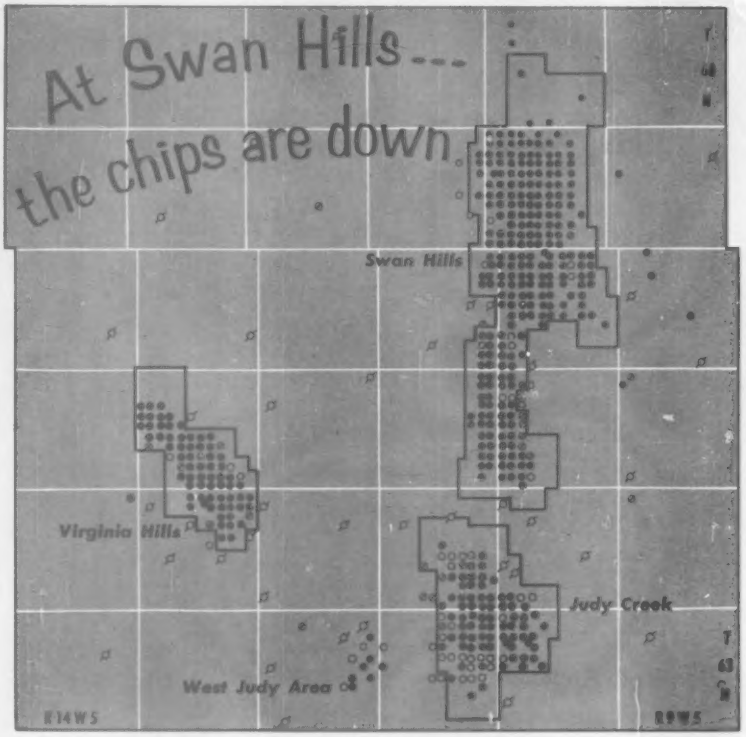
Corban®, the Dowell family of polar-type corrosion inhibitors, is offered in 17 varieties to meet — and combat — well corrosion problems. Corban comes in three forms: "ready-to-use" liquid, concentrated liquid, and sticks. Also more than a dozen formulas — for sweet crude, sour crude or gas condensate wells. Available immediately at 150 points in the oil country through Dowell offices and stations.

Products for the oil industry

DOWELL

DIVISION OF THE DOW CHEMICAL COMPANY

DIAL DOWELL



SATELLITE RESERVOIRS is probably the most apt description of the Swan Hills region. In an area of less than 1,000 sq. miles there are 43 rigs.

Swan Hills action abounds in area of jackpot reservoirs

ONE OF THE LARGEST concentrations of rigs on the North American Continent is seen at Alberta's Swan Hills region. In an area less than 1,000 sq. miles there are 43 units. Of this total, 34 are active rigs.

This represents a present-day replacement investment of $21,500,000 for the 10,000 to 12,000-ft. equipment. The center of activity is the development of the Swan Hills, Virginia Creek, Judy Creek, and West Judy Creek fields.

Virginia Hills was discovered 3 years ago and after a slow start, the four-field region now has 385 producing wells. Swan Hills field has 240 wells, Judy Creek has 72 wells, Virginia Hills has 66 completions, and West Judy area is the least developed with only 7 wells.

Exploration is still going on but the bulk of the effort is devoted to development. There are 32 development tests and 2 exploratory wells now drilling. One operator, Imperial Oil Limited, recently announced 14 new locations and the firm is planning to keep 9 units active all winter. The winter months are suitable for drilling in the area, and operations will persist until the spring thaw while the frozen ground aids mobility of the heavy equipment, according to Daily Oil Bulletin, Calgary, Alta.

Reserve estimates of the region are encouraging—over 734,000,000 bbl. are believed to be recoverable. Pending further development of Judy Creek and West Judy Creek field, and the possible linking of the two of them, reserves could be yet greater (see OGJ, Nov. 28, 1960, p. 111).

Contractors . . . Both large and small drilling firms are present: Peter Bawden Drilling Co. has five rigs in the area and four are active; Brinker-

New ELDER
"Knock-Down"
Field Housing Units

Save up to 80%
on shipping costs!

Shipping costs drop, handling speeds up with Elder's "Knock-Down" units. Now you can ship field housing overseas or move complete camps to new locations at one-fifth the cost!

"Knock-Down" units are quickly erected with a minimum of labor. Side walls, mounted on continuous hinges, simply raise into place. End walls are bolted into side walls and frame. Fiberglass roof is one-piece construction.

Elder designs and builds all types of mobile housing for field crews.

Knock-down unit ready for setting up.

Side walls go up first.

End walls and roof are locked securely into place.

Unit erected.

Eight knocked-down units loaded and ready for shipment.

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hoff Drilling Co., Ltd., has three active rigs; Canbridge Corp., Ltd., has two units with one active; Can-Tex Drilling Co. has two active rigs; Cascade Drilling Co. has two of three units working; Commonwealth Drilling Co., Ltd., has five active rigs; Duke Drilling Co., Ltd., has one unit working; Gustavson Drilling Co., Ltd., has one drill running; Hi-Tower Drilling Co., Ltd., has all four of its rigs going; Imperial Oil Limited has a rig working; Loffland Bros. Co. of Canada has one of its two rigs running; Lohmann-Johnson Drilling Co., Ltd., has one unit at work; Parker Drilling Co. of Canada has two rigs going and one down; Pennant Drilling Co. is operating two of its three rigs; Reading & Bates Drilling Co., Ltd., has one of its two rigs working; S & T Drilling Co., Ltd., has its rig down; and Regent Drilling Co., Ltd., is working three of its four units.

Operators . . . Both majors and independent operators are drilling wells in the Swan Hills region. Imperial Oil Limited has eight wells under way and will increase this to nine in the near future. Pan American Petroleum Corp. is the operator of a joint program with British American Oil Co., Ltd., and these two firms are drilling seven wells while Pan American is also drilling a well of its own. Hudson's Bay Oil & Gas Co., Ltd., is operating four wells for a group comprised of: Union Oil Co. of California, Ltd.; Home Oil Co., Ltd., and Associates; and Regent Refining (Canada), Ltd. Hudson's Bay is also drilling a well of its own. Home Oil is operating three wells for a group consisting of: Regent Refining; Alminex, Ltd.; and United Oils, Ltd. Home is drilling another well for Home, United, Kern County Land Co., and French Petroleum Co. of Canada, Ltd. Shell Oil Co. of Canada, Ltd., is operating four wells. Other firms drilling single wells are Calgary & Edmonton Corp. and its partner, Kern County Land et al.; Canadian Kewanee, Ltd.; Pure Oil Co.; and J. Ray McDermott & Co., Inc.

The wells seek the Devonian-Beaverhill Lake formation which is found at varying depths between 8,400 and 9,300 ft. Average costs for the wells are from $130,000 to $175,000. A wildcat will often run about $200,000. It takes from 24 to 35 days to drill the tests and about 30 bits are required. The net pay average figures are good and will run from 57 ft. average at Virginia Hills to as much as 160 ft. in some sectors of Swan Hills field. The oil runs between 40°-42°, and it is believed that the recovery factor of the oil in place is from 20 to 25%.

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These high quality and dependable squeeze packers are used to form an effective plug in "squeezing" cement or fluid below packer through tubing or drill pipe at any predetermined point behind liner or casing; around shoe or shoe joint. Can also be used as casing bridge plugs for preventing movement of fluid through packer from either direction.

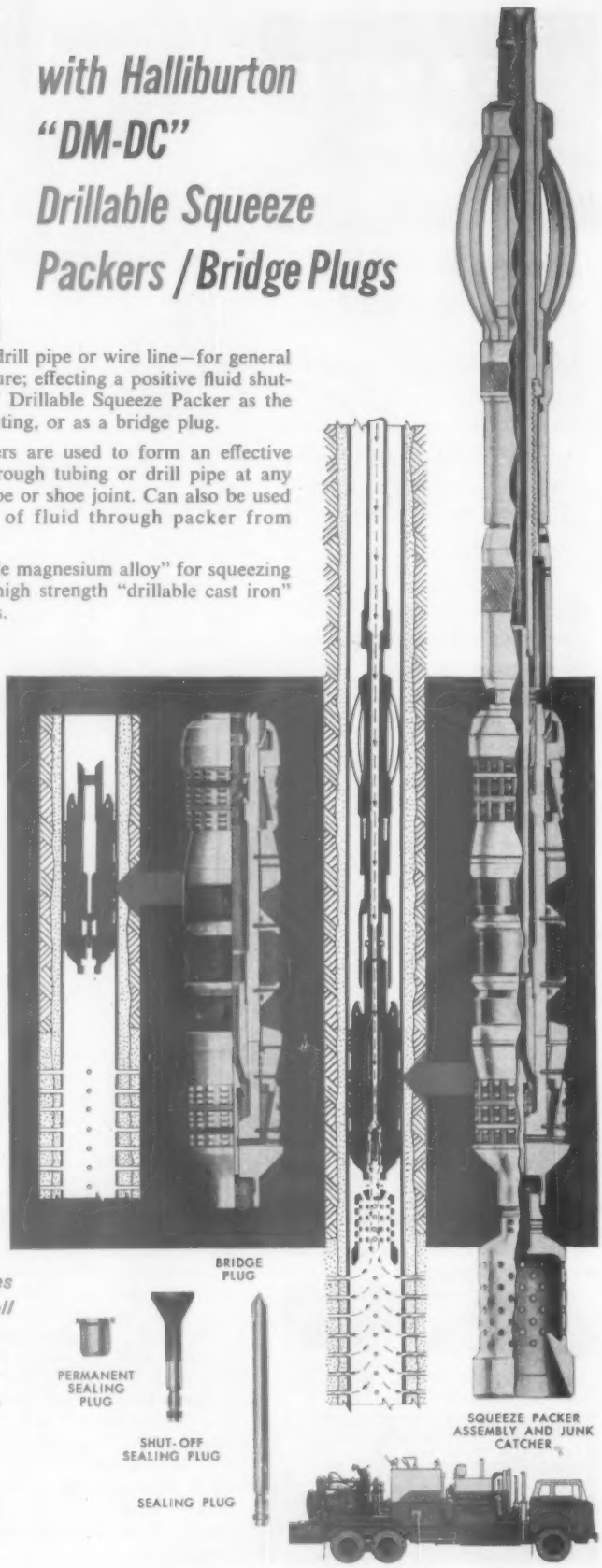
Type "DM" is constructed of high strength "drillable magnesium alloy" for squeezing or temporary bridge plugs . . . type "DC" is made of high strength "drillable cast iron" for squeezing or permanent or temporary bridge plugs.

Several additional advantages and outstanding features of this packer are:

- Tubing and circulating valve are free from packer before squeezing begins; can be picked up as desired between stages.
- Tubing and circulating valve can be removed from well any time for tubing leak repairs; then re-enter the packer.
- No strain is taken on tubing while squeezing.
- Packer will withstand *any* pressure that can safely be put on casing or tubing.
- The back pressure valve is the sealing cup type which provides a more positive seal.
- Can be set with Halliburton Electrical Wire Line Setting Tool, and the "DCM" Cup Type Setting Tool . . . methods that afford substantial savings in time, wear on casing, tubing, drill pipe and rig.

A shut-off sealing plug to prevent contamination, may be pumped down 2" or 2½" tubing, between fluids, and shut off in the packer.

A "DM-DC" Squeeze Packer may be converted into a bridge plug by dropping a sealing plug down through the tubing or installing a permanent sealing plug before running into well.



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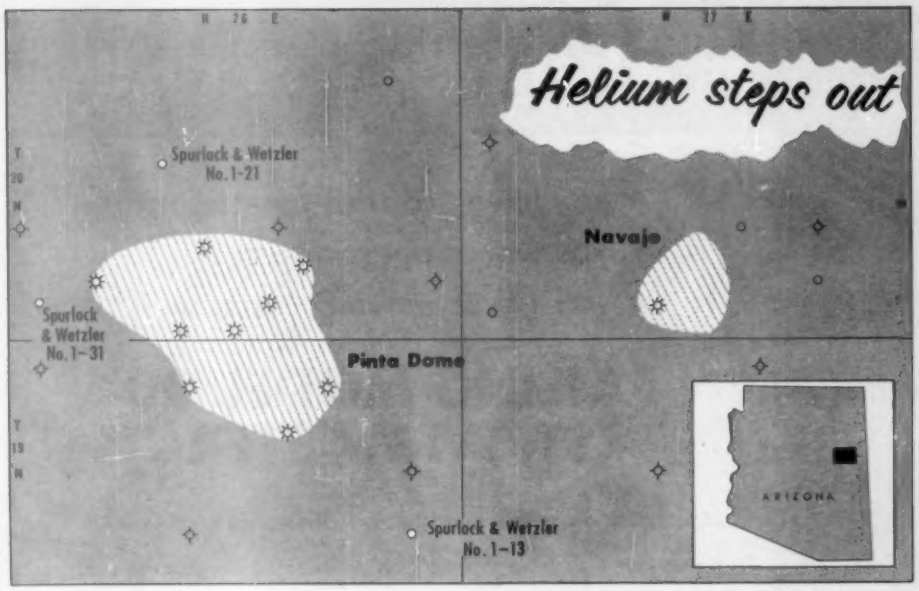

THREE outpost wells will be drilled at Pinta dome, Apache County, Arizona, in 1961. Linehan & Stoltenberg will try to enlarge the field limits with the three Spurlock & Wetzler tests shown here.

"Noble gas" is new target for 1961

BY FRANK J. GARDNER

IT'S ODORLESS, tasteless, colorless . . . and very expensive. It's everywhere, and yet it's not. It's as valuable as gold, and much more rare. And as far as we know, North America has a monopoly on the stuff.

It's helium, of course.

The oil industry is taking a growing interest in this rarest of gases, following the recent passage of a bill in Congress enabling the Interior Department to negotiate helium-extraction-plant construction with private firms. Prior to that, the Government was the sole processor, with five plants; these are at Amarillo and Exell, Tex., Otis, Kans., Keyes, Okla., and Shiprock, N. M.

Plants will rise . . . Up to this point, all our helium production has come from those few spots. Now, we can expect plants to go up at several other known helium hideaways, including the richest deposit yet found, at Pinta dome, Apache County, Arizona. Helium does not occur as helium per se, but as a minor constituent of natural gases; at Pinta, the helium percentage is 8 to 9, compared to an average 2% in the Panhandle fields. Other rich deposits are known to exist at Harley dome, Grand County, and at Woodside dome, Emery County, both in Utah; these, both with 7% content, are now held as government reserves. The old Model gas field of southeastern Colorado also yielded gas containing 7% helium.

Why have these richer fields not been developed and commercialized in preference to the leaner Panhandle fields? Largely because of the huge amounts of host gas in the Panhandle and because that gas can be burned after the helium is extracted. Pinta gas is noncombustible and contains 90% nitrogen and only a trace of methane.

Typical of the new interest being shown by oil men in the helium industry is a pending exploration program at Pinta dome. Two intrepid operators from Midland, Tex., will drill three outposts to the field in an effort to boost the proven reserves. Charles M. Linehan and H. W. Stoltenberg have announced location for the three tests as follows: 1-13 Spurlock-Wetzler in Section 13-19n-26e, 1-21 Spurlock-Wetzler in Section 21-20n-26e, and 1-31 in Section 31-20n-26e (see map). Success at any of these could greatly enlarge the Pinta area, and call for a complete revision of reserve estimates for the field.

Principal operators at Pinta until now have been Kerr-McGee Oil Industries, Inc.; Eastern Petroleum Co., and Crest Oil Co. Kerr-McGee now has six commercial helium wells, and Eastern has three. Crest has one discovery, now dubbed "Navajo," 4 miles east of Pinta in Section 33-20n-27e (map), and is engaged in an active drilling program to prove up the field. It is not known whether Navajo is on a separate structure or is an extension to Pinta itself; at the moment, the separate structure seems more plausible. Crest's score now is one dry hole, one temporarily abandoned gas well, two new locations, and one drilling well, all east of the discovery, plus one new location between Navajo and Pinta (map). Eastern drilled a dry hole 2 miles south of the Navajo discovery.

Along with reserves . . . The Pinta gas is found at a shallow 780-1,200 ft. in sands of Chinle-Triassic and Coconino-Permian age. The Coconino is the major reservoir in the field. Reserve estimates vary with the estimator: Kerr-McKee says 7½ billion cubic feet of recoverable gross gas containing 0.6 billion cubic feet of pure helium; Eastern pegs the field at 22.5 billion gross gas, and 1.8 billion net helium. An average of the two produces 15 billion gross, 1.2 billion helium.

High or low, the estimates indicate a rich deposit of what Eastern calls "this noble gas." It's not the world's **largest** deposit of helium, but it **is** the richest. And with men like Linehan and Stoltenberg, and independent companies like Eastern, Crest, and Kerr-McGee competing for advantage, it just might turn out to be the largest **and** the richest . . . rich in more ways than one—it will sell for $40.00 per M.c.f.

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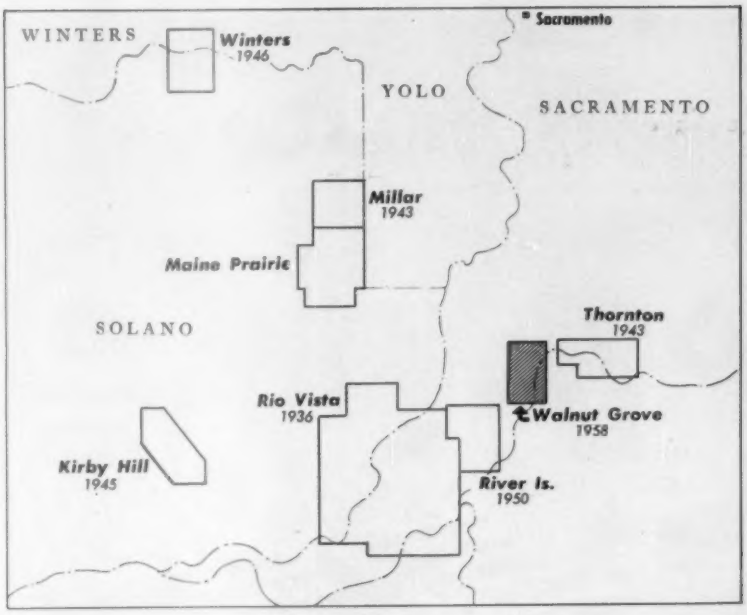


FIG. 1.

Walnut Grove gas field shows how . . .

Management thinking changes in California

BY MICHAEL R. RECTOR
Consulting Geologist
Bakersfield, Calif.

THE HISTORY of the Walnut Grove gas-field area, about 20 miles south of Sacramento, is typical of the exploration pattern of the Sacramento Valley. It reflects the changes in management thinking involving overall exploration planning and the economics of stratigraphic reservoirs. Before 1950, most company exploration plans for the Sacramento Valley were geared to a program of locating and testing closed anticlinal structures which were blanketed by objective sands.

Rio Vista, the ideal gas field with several hundred feet of structural relief and more than one objective sand, was discovered in 1936 by Amerada Petroleum Corp.

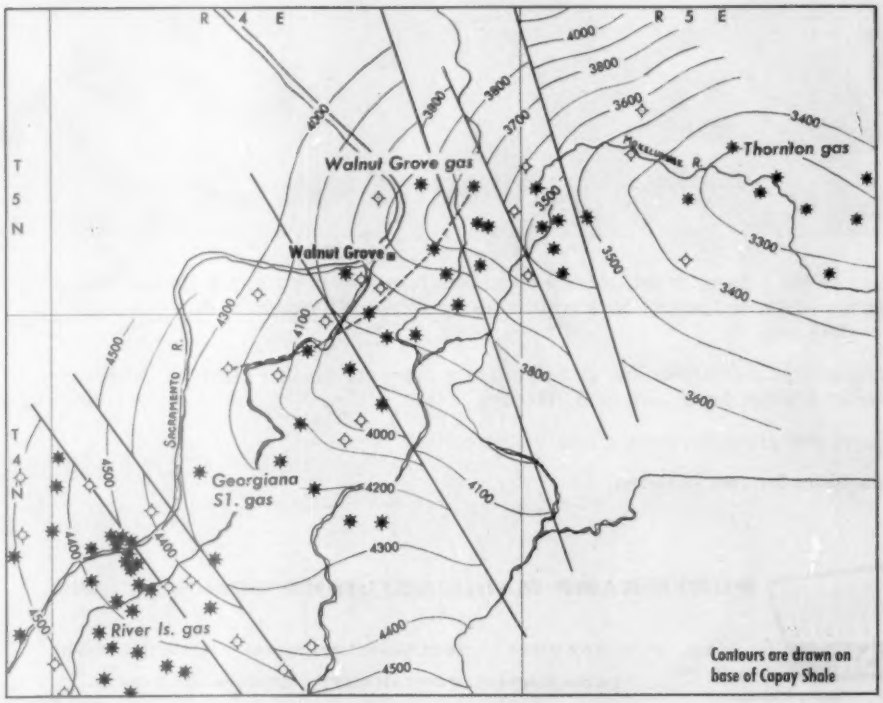
In 1943, Thornton and Millar fields, both seismic highs, were found to be productive.

These successful ventures helped to establish the exploration targets which were to be acceptable to big-company managements for the following 10 years.

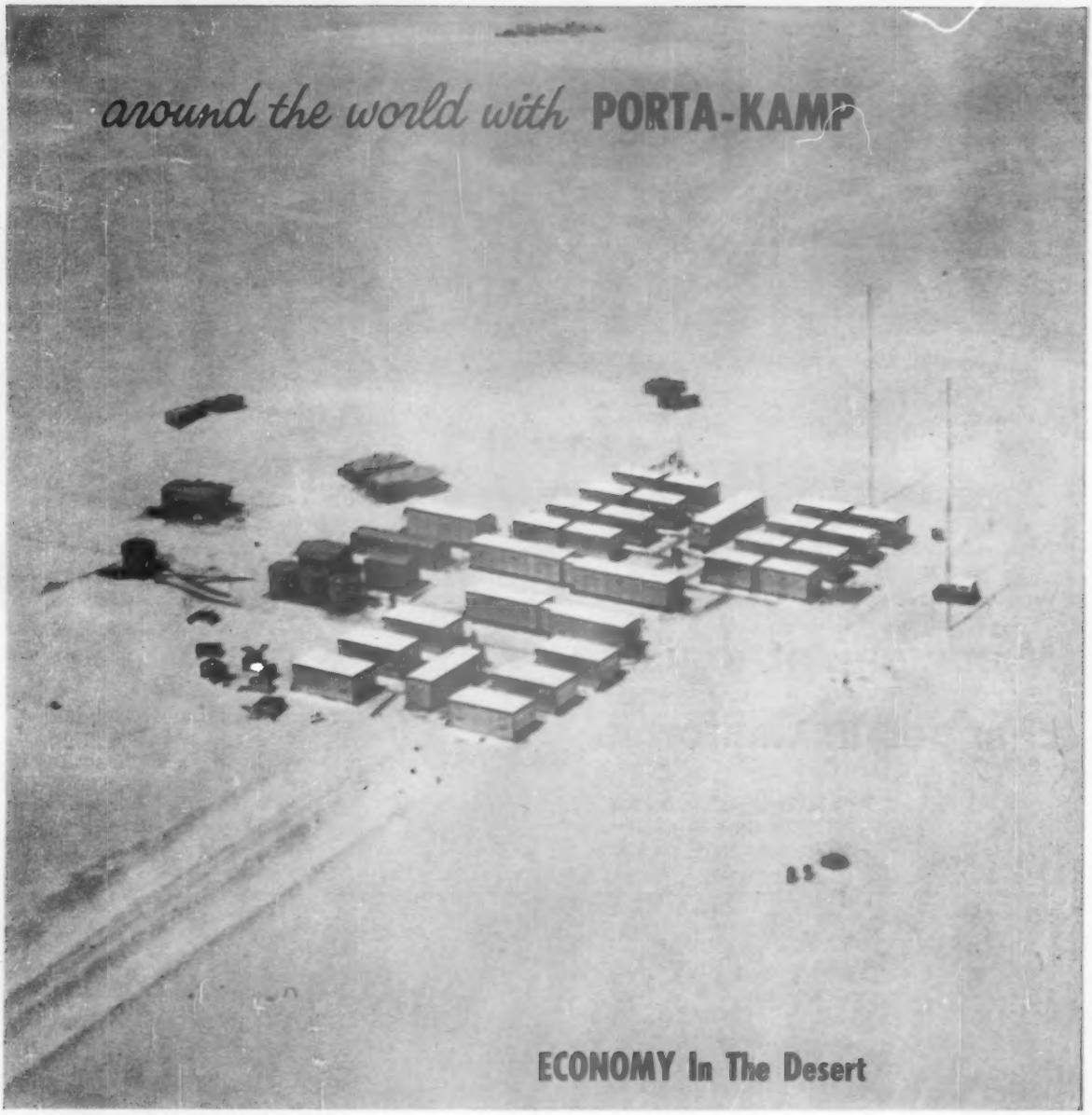
Stratigraphic Production

By 1950, Brazos Oil & Gas Co., a subsidiary of Dow Chemical Co., had extended production eastward from Rio Vista Isleton field to what is now called River Island field, where stratigraphic production from thin sand stringers in the Nortonville and Capay, formations of Eocene age, was obtained in downdip wells on small

Presented before the Pacific Section, AAPG, forum meeting in Los Angeles.



WHAT APPEARS as a simple faulted nose, according to contours on the Tertiary - Eocene Capay, is actually a stratigraphic trap that has undergone faulting. Fig. 2.



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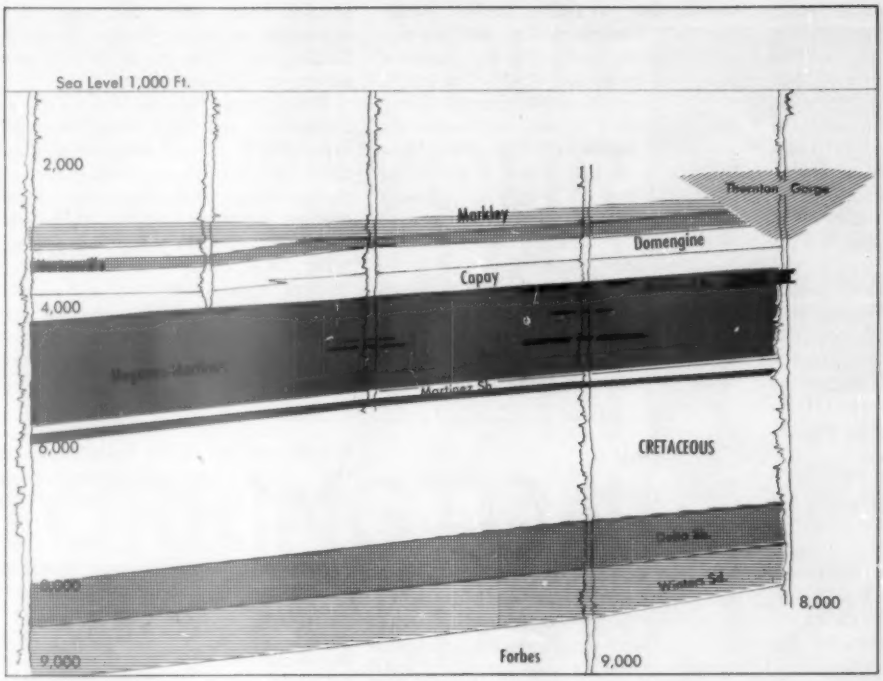


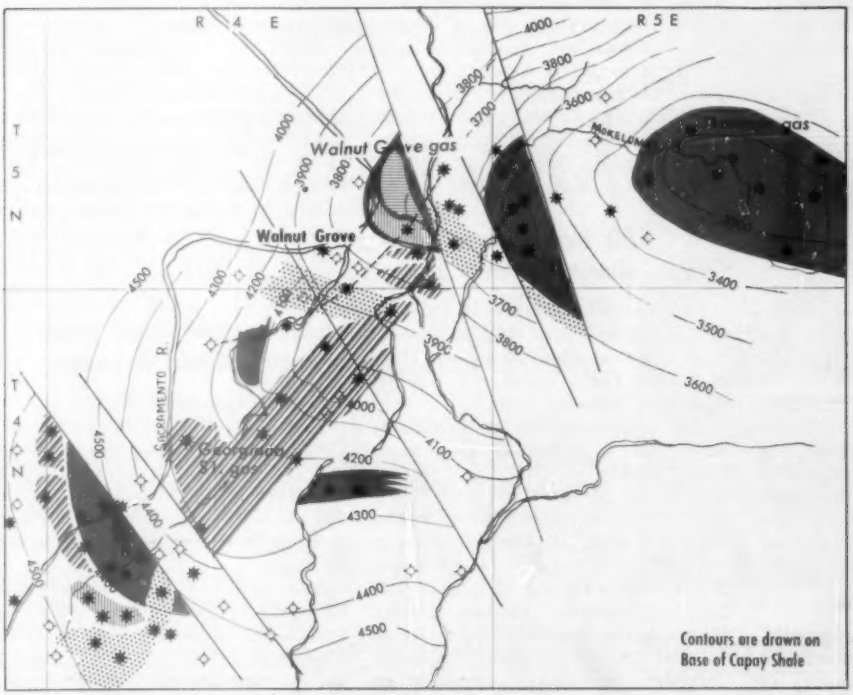
SAND distribution in this cross-section indicates the extent of the stratigraphic reservoirs. Fig. 3.

fault-block closures. It was the production history obtained here over the next 5-year period which encouraged Texaco Inc., to explore and develop the Georgiana Slough area and ultimately led others to gamble on the deeper Cretaceous sands at Walnut Grove and elsewhere.

By 1955 the Brazos discovery well at River Island had produced about $400,000 worth of gas from an 8-foot sand in the Capay interval from a depth of approximately 4,100 ft., and other stratigraphic producers were still going strong.

With this in mind, it is not surprising to see the eyes of management focus upon deeper stratigraphic objectives at Walnut Grove after the Sunray Mid-Continent Oil Co. "Collins-Mealer" well penetrated Cretaceous (Winters) sands from 8,740 to 9,050 ft. on a location about 3 miles west of the town of Walnut Grove in July of 1956.

It then became apparent that a deep stratigraphic play existed between this well and the Standard Oil Co. of California "Patterson Construction Co.", well at West Thornton, which had no



AREAL EXTENT of sand lenses superimposed on contours helps explain why Walnut Grove area is a pure stratigraphic trap. Note the irregular pattern of producing and dry tests. Fig. 4.

Upper Cretaceous (Winters) sand.

For the next 2 years, many shallow objective plans were shelved and the deeper programs were investigated. Town-lot leasing and unit operation procedure were negotiated near the town of Walnut Grove and by 1958, 15 years after the discovery of Thornton gas field, the "Walnut Grove unit" A-1 was drilled by Brazos Oil & Gas Co. as operator for Union Oil Co. of California, Texaco Inc., and Standard Oil Co. of California.

This well tested the Winters sand and although these deep objective sands were found to be wet, several shallow gas pools were discovered. Subsequent drilling has found these Cretaceous (Winters) sands productive, higher on the structure.

Although production at Walnut Grove was found on the westward-plunging nose of Thornton gas field, the geology resembles that of River Island gas field. Crossfaulting transects the nose forming a series of fault-block reservoirs which appear as stairsteps between Thornton and River Island fields. High on each of these closures gas has accumulated structurally against the fault, and numerous stratigraphic units have also been discovered on the flanks of these structures.

Search for Ideal

In this search for the "ideal" gas field no doubt some commercial production has been overlooked, and some discoveries have been delayed.

The delay of discovery may turn out to be an advantage in favor of present operators in the area, since the value of natural gas has been riding the escalator.

During the 1930's, 9 cents per 1 M.c.f. was considered a good price. By 1940, 17½ cents per M.c.f. was being paid and increased annually until a price of 28 cents per M.c.f. was reached during the 1950's. Present natural-gas prices vary with the B.t.u. rating and with the geographic location of production, but nearly all contracts include an escalator clause, providing for an annual increase.

Drilling Activity

Operators, now using approximately 25 drilling rigs, are looking for the stratigraphic production which has been overlooked or as yet not drilled because of a depth factor. Consequently, wells are being drilled deeper and located offstructure in many cases.

Results of New Approach

The results of this "new approach" to exploration in the Sacramento Valley have shown in the discovery of several new gas fields. Beehive Bend-Willows, Perkins Lake, and Comptons Landing with the gas reserves estimated to exceed 324,000 M.M.c.f. were discovered and developed during the 1953-1955 period. Although the producing sands were found at depths ranging from just below 2,000 ft. to depths of nearly 7,000 ft., the most prolific producing reservoirs were penetrated, at Beehive Bend-Willows gas field, below 6,000 ft.

It is interesting to note that the "better" wells are located nearly 1,000 ft. structurally lower than other producing wells on the Beehive Bend-Willows structure. More recent stratigraphic finds which are now being developed are: Arbuckle, Buckeye, Grimes, and Dunnigan Hills deep pool which was discovered this year.

Stratigraphic objective sands of Cretaceous age have been found below 7,000 ft. in each of these new gas fields. Many of these discoveries were made within a short distance of earlier, shallow structural tests drilled by operators who were looking for another "Rio Vista."

With sights readjusted, old experts are now learning "new tricks" to keep abreast of the current competitive search for natural gas in the Sacramento Valley.

Ohio well is completed

In Ohio, Hoosier Oil Co. of Owensboro, Ky., has just completed 1 Wesley Teal in Falls Township, Hocking County, Ohio, to a total depth of 2,755 ft. Thirty-two feet of oil-saturated Clinton sand formation was encountered, with a show of 4 bbl. natural when the well was drilled in.

The well was fractured with 1,000 bbl. of water and after recovery of water, it went on oil and pumped and flowed 90 bbl. of oil the first 24 hours.

Hoosier also just completed the 2 Melvin Ashcraft in Section 12, Fallsbury Township, Licking County, Ohio, which, after recovery of fracturing oil, flowed 400 bbl. the first 12 hours through a 1/16-in. choke and was shut in for lack of tankage. The well has been flowing 100 bbl. of oil per day since October. Hoosier is now moving in to drill 3 Ashcraft.

Hoosier has moved a rig on the Fred and Angie Dykes farm in Section 4, Marion Township, Hocking County, Ohio, and plans extensive drilling operations after these successes.

First 1960 strike for Kansas side of Kaneb

The first oil discovery of the year for the Kansas side of the Kaneb basin is indicated at Blair Associates-Murfin Drilling Co. 1 Walsh in C NW SE 15-1s-32w, Rawlins County.

The well, 1½ miles east of Wilhelm field, got 75 ft. of heavily oil-cut mud, 60 ft. muddy oil, 300 ft. of frothy oil, 270 ft. of gassy oil, and 30 ft. of water on a drill-stem test in the Lansing-Kansas City Pennsylvanian at 3,958-90 ft. A test at 4,047-82 ft. got 260 ft. muddy oil and 60 ft. clean oil. This northeastern Rawlins County wildcat is the first indicated strike of the year for this portion of the basin. Only last year the Kansas side of Kaneb was one of the busiest areas in the nation, only to give way to Nebraska's Redwillow County boom this year.

Marion County. Texstar Petroleum Co. is testing a wildcat gasser 1¾ miles north of Tajchman field. The 1 Jewitt, SW SE NW 9-19s-5e, 7 miles northeast of Marion, flowed 5,690 M.c.f.d. during Mississippian tests at 2,182-2,217 ft.

Deep wildcat slated for Oklahoma's Washita

A 17,500-ft. wildcat is planned for Washita County in western Oklahoma. Gulf Oil Corp. will drill 1 Anna Tabor in NE SW 24-8n-15w as a test of Springer Pennsylvanian rocks. Location is 8 miles northwest of West Carnegie pool in the deep-trough area of Anadarko basin.

Mobil Oil Co. 1 Davis unit, NW SE 27-15n-16w, was completed flowing 497 M.c.f.d. from Hunton Siluro-Devonian perforations at 14,615-70 ft.

Shell Oil Co. completed 1-20 Booth in NE SW 20-28n-24w flowing 8,800 M.c.f.d. and 5 bbl. condensate per million from Chester Mississippian at 6,198-6,308 ft. in the northeastern part of big Mocane-Laverne gas field, northwestern Oklahoma.

New Canyon sand pool opened in North Texas

New Canyon sand production is reported at a well in northeastern Cooke County, North Texas. The discovery well is Sinclair Oil & Gas Co. 5 W. T. Montgomery, originally completed in 1953 as a dual conglomerate producer at 5,061-94 ft. and Hudspeth at 4,708-20 ft.

The well, 1¼ miles southwest of Cosefield in the Robert Finlay Survey, A-389, is now making oil in the Canyon at 2,440-12 ft. Flow was 178 bbl. per day through 16/64-in. choke.

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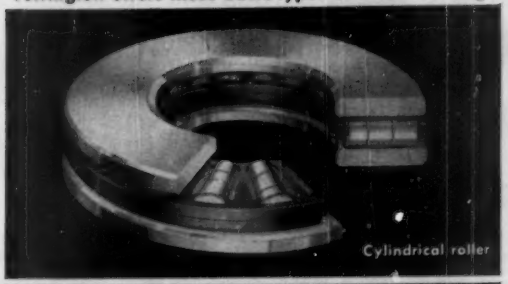
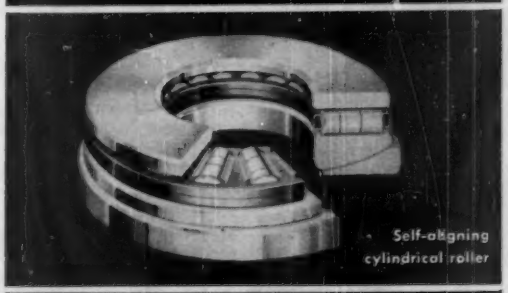
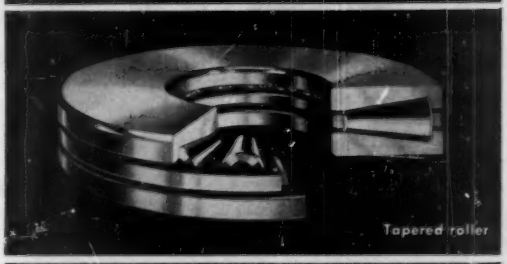
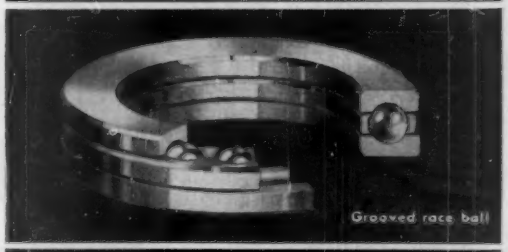
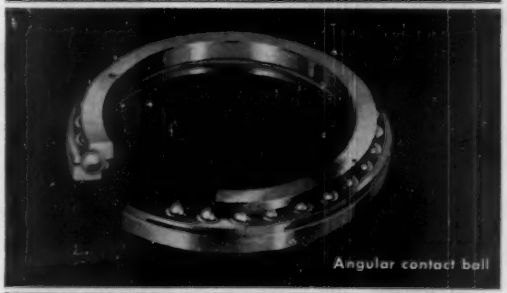
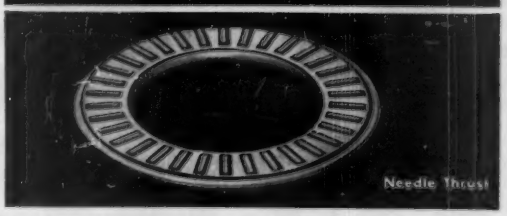

Cylindrical roller


Self-aligning cylindrical roller


Tapered roller


Grooved race ball


Angular contact ball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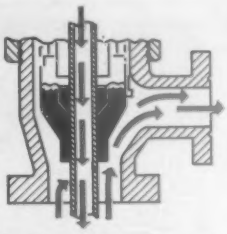
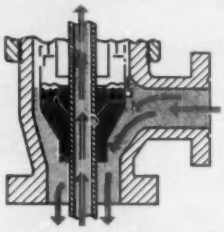
DRILLING WITH AIR OR GAS?



There is a steadily growing use of air or natural gas to replace the mud column in many drilling operations. Advantages include faster drilling rates, more footage per bit, no "lost circulation" problems, and greater production recovery.

The ideal unit for sealing off around the drill string and maintaining safe pressure control is the Shaffer Combination Rotating Blowout Preventer and Stripper. It not only permits the well to be drilled safely, but also it can be adapted to be used as a casing stripper during casing operations to maintain pressure control.

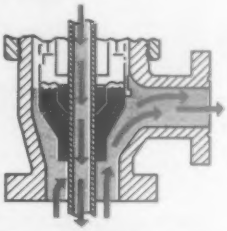
DRILLING WITH REVERSE CIRCULATION?



Reverse circulation is another of the modern drilling techniques that have definite advantages in certain types of formations. By returning the cuttings through the inside of the drill string, higher return velocities are obtained at lower pump pressures (and lower pressures on the formations). The higher velocities insure larger cuttings being returned from the formations, in many cases eliminating need for coring and thus saving rig time. Also by carrying large cuttings away faster, bit life is lengthened and drilling time is reduced.

These and other advantages make Reverse Circulation techniques worth investigating — and here again, the key to proper operation is a Shaffer Combination Rotating Blowout Preventer and Stripper to seal off the drill string and to control circulation pressure while drilling.

NORMAL DRILLING OPERATIONS?



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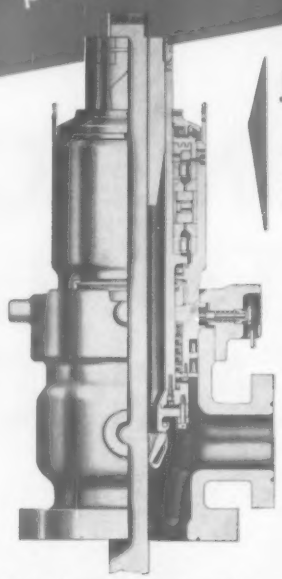

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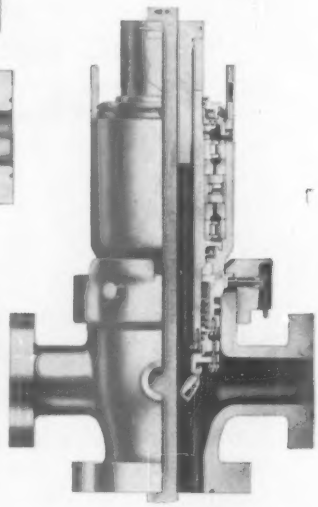

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West Texas. Crane County has a new Devonian discovery about 16 miles southwest of Crane. The well is Gulf Oil Corp. 634 W. N. Waddell et al.

Gulf's find flowed 140 bbl. of 45.6°-gravity oil daily through 16/64-in. choke from perforations at 5,655-5,725 ft. Gas-oil ratio is 1,213:1. Location is in Section 7, Block 3, H&TC Survey, 1½ miles north of Cordona Lake field and 1½ miles northeast of McKee field.

Good Ohio strike is completed

In Ohio, the best strike in North Logan pool, a 600-bbl. producer, was reported completed by the operator, John Adams upon a 24-hour test 3 weeks after fracture. The 3 James Hall, Section 31, Falls Gore Township, Hocking County, an eastward extension found the Clinton at 2,785-2,819 ft. with a showing of oil and gas natural.

Two more successes are added to the play developing west of Spring Mountain in Monroe Township, Coshocton County. Natol Corp. 2 Louis Kanuckle, Lot 27, 3 Qt., was finaled as the best gasser in the pool to date, having a gage of 4,060 M.c.f.d. after fracture. Also, in Lot 27, 3 Qt., William Patten reported the 1 Louis Kanuckle finaled 103 M.c.f.d. after fracture. The Clinton sand was logged at 3,199-3,226 ft. and 3,358-74 ft. respectively.

Four wells drilling in Montana's Keg Coulee

Operators are working at three wells and testing at the fourth at Montana's Keg Coulee field, Musselshell County.

Don McGregor and Hose - Austin Drilling Co. are below 3,055 ft. at the 1 Butts in C SE SE 26-11n-30e. Sumatra Oil Co. is drilling below 4,190 ft. at 1 Baker-State in C SW NW 36-11n-30e. This area is on the west side of the field. On the east side, American Climax Petroleum and Continental Oil Co.-Lawrence Baker, Jr., are drilling below 1,889 ft. at the 31-16 DeJaegher in SE SE 31-11n-31e. All three wells are offset by producers. The same group of operators swabbed 214 bbl. of oil in 7 hours and are testing at 31-10 DeJaegher in NW SE 31-11n-31e. Recovery is from Tyler through perforations at 4,530-46 ft. Keg Coulee field is 2 miles south of Ivanhoe field.

Williston basin. Sun Oil Co. has run pipe at the second well in a new Madison Mississippian area northwest of Dwyer field in Sheridan County. This new well apparently confirms the Signal Drilling & Exploration Co. discovery.

Amerada's Devonian discovery on the Bear Den unit in McKenzie County, North Dakota, has been acidized and tests are under way.

Fifth Minnelusa well swabs oil in Wyoming

The fifth Minnelusa Pennsylvanian well in Raven Creek field, Campbell County in northeastern Powder River basin, Wyoming, swabbed 18 bbl. per hour. It is the Kewanee Oil Co. 1 Pickrel in NE SE 14-48n-69w.

Production is from perforations at 8,310-40 ft. This is the southernmost well producing from Minnelusa in the field. There are two other Minnelusa wells going in the field. Kewanee is below 7,402 ft. at 1 Federal-A in SW NW 11-48n-69w. Mobil Oil Co. is below 7,500 ft. at F-34-11-G in SW SE 11-48n-69w. Shell Oil Co. has a well staked in NE NE 14-48n-69w and Mobil in SW NW 11-48n-69w.

Kewanee opened the field earlier this year at 1 Norman in NE NW 14-48n-69w. Pump gage was 440 bbl. per day. A southeast offset to that discovery was completed by Kewanee

Toronto-Dominion Bank Appointments

R. GORDON HUMPHRIES P. Eng. — W. G. PRINTZ

The Toronto-Dominion Bank announces the appointment of Mr. R. G. Humphries as Manager of its Oil and Gas Department, Calgary, and Mr. W. G. Printz as Special Representative, Alberta Division.

Mr. Humphries is well-known throughout the oil industry. He graduated from the University of Alberta in 1949 and prior to joining "The Bank" was employed as a Petroleum Engineer in Western Canada.

Mr. Printz was formerly manager of one of "The Bank's" Edmonton Branches and is well-versed in the many financial aspects of development within the petroleum industry.

Mr. W. F. Sadler, formerly Oil and Gas Department representative in Calgary, has been transferred to the position of Supervisor, Credit Department, Head Office.

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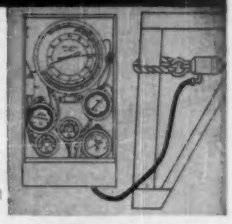

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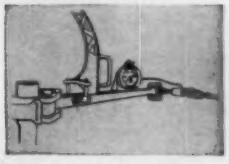

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and Shell has two wells northwest of the discovery. Nearest Minnelusa production is 8½ miles north at Donkey Creek field. Robinson Ranch, another Minnelusa field, is 12 miles northeast of Raven Creek and Timber Creek is 10 miles northwest.

Colorado's newest producing area is Pitkin County

First production for Pitkin County in the high Colorado Rockies of western Colorado is reported at a remote wildcat discovery. Utex Exploration Co. 1 Cal in NE NW 26-8s-90w, Pitkin County, flowed up to 3 M.M.c.f.d. on early tests. Later flows reported went to 3,500 M.c.f.d. Sample top of the Cozette is 4,652 ft. Drill-stem test was at 4,653-4,700 ft. Location is 5 miles east of Divide Creek field.

Independent to drill near Mexican border

A wildcat location has been staked in the southeast corner of California just 36 miles north of the Mexican border.

Bernard J. Patton, La Jolla, Calif., plans to drill the 1 Midway well in 6-11-21e in Imperial County. Patton will take the well to 2,500 ft. Location is within 350 ft. of a 1,320-ft. well which was drilled in 1954 and later converted to a water well. There were some oil shows in the 1954 well.

The Patton location is 7 miles west of the Arizona border and 20 miles southwest of Blythe, Calif.

Town-lot test dry in California

MOBIL Oil Co. has abandoned the 1 Venice in 17-2s-15w in Los Angeles County at a total depth of 6,024 ft. The wildcat is in the extreme western portion of the metropolitan Los Angeles area. The nearest production is about 1½ miles away at Playa del Rey field. Mobil has no immediate plans to drill another well on the acreage.

Oil-shale project is discussed

The possible value of Illinois oil shales as sources of oil and gas is discussed in a report published by the Illinois State Geological Survey.

A chemical evaluation of four black shales and one limestone sample provided information on the yields and characteristics of oil and gas produced from Illinois shales under described conditions of retorting.

The American petroleum industry has become increasingly aware of the

importance of oil shale resources within the last few years, and it is possible that a commercial oil-shale industry may become operative in the future.

Before discovery of the Drake oil well in Pennsylvania in 1859, more than 50 companies were producing oil by the destructive distillation of various kinds of bituminous materials, including cannel coals, bituminous coals and oil shales. One such operation was located in Illinois.

When petroleum refiners, however, flooded the market with large quantities of low-cost kerosine and lubricating oils, retorting oil shale became unprofitable.

The future of the oil-shale industry is dependent on the supply of crude petroleum from both domestic and foreign sources. As the cost of finding and producing petroleum becomes greater and reserves are depleted, the dollar spread between petroleum fuels and oil-shale fuels may disappear. Oil shale may take its place as a source of liquid and gaseous fuels.

Circular 307, "Chemical Evaluation of Illinois Oil Shales," was written by W. J. Armon and Dr. O. W. Rees. It is available from the offices of the Illinois State Geological Survey, Urbana, for 4½ cents postage.

Ohio's Union Furnace adds producer

In Ohio, another good producer was brought in by A. M. Carlson on extension of Union Furnace pool in Washington Township, Hocking County.

The 1 W. Horn 22, an eastern stepout made 135 bbl. of oil and an estimated 1 M.M.c.f.d., 6 days after fracture from the Clinton sand at 2,904-30 ft. This marks the third straight success with more than 100 bbl. initial this operator has completed in the area. Five strings of tools are presently active in the township.

Western Oklahoma drillers to probe deep

Deeper exploration is going to be in evidence in western Oklahoma during the first part of the new year.

Gulf Oil Corp. reportedly will renew operations at a Roger Mills County wildcat that was originally drilled 7 years ago by Carter Oil Co. The 1 Hartley, NE NE NW 34-14n-26w, a deep wildcat, went to 12,384 ft. Gulf plans to take this wildcat to the Morrow Pennsylvanian.

Southeast of Gulf's planned renewal is Schafer Oil Corp., sponsor for a large lease campaign carried out by Union Oil Co. of Oklahoma a few months back. Schafer's block spreads through Sections 2-9 and 10 of 15n-24w, and Sections 32, 33, 34 of 16n-24w.

In western Oklahoma, Pan American will drill 1 Purdum, a Chester Mississippian wildcat in C NE SW 3-22n-25w. There has been no drilling in the immediate area. Location is 4 miles southwest of South Chaney gas field and 5 miles east of North Linscott gas field.

Anadarko basin. Kenneth Ellison is setting up workover plans for an old Continental Oil Co. well at 1 Smith, C SE NW 32-10n-12w, the discovery of East Eakley oil field in 1952. Ellison will go to Simpson. The discovery well of the noncommercial field made 30 bbl. per day from Hoxbar at 9,053-9,315 ft. The wildcat went to 15,545 ft., topping Deese at 11,088 ft. Location of this old well is 1½ miles northwest of Elliston 1 Miller-Long unit in 4-9n-12w. Workover operations here were stopped recently after failing to get production. This well went to 21,021 ft. total depth. It was first spudded in November 1957.

Cleary Petroleum Inc. et al. will try to confirm deep Northwest Blanchard

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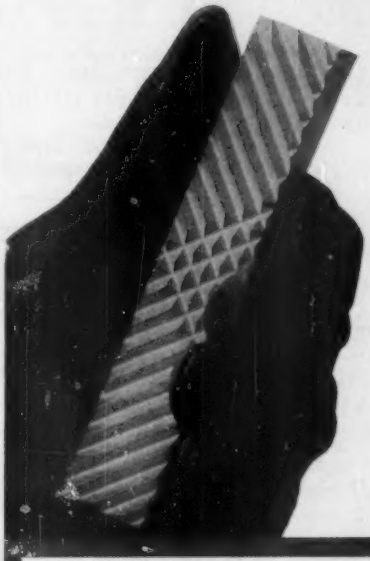

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field, a new Grady County discovery. The 1 Hilltop, discovery well in C NE SW 16-8n-5w, flowed 30,500 M.c.f.d. with 104 bbl. condensate per million on completion earlier this winter. Production is from first and second Bromide Ordovician sands below 11,700 ft. The 2 Hilltop unit will go to 12,000 ft. in C NE 17-8n-5w.

Two East Texas finds confirmed

EAST TEXAS' enlivened Jurassic play is receiving additional encouragement by confirmation of two of this year's discoveries—one in Cass County, and the other in Wood County.

In Cass County, Shell Oil Co. and Cities Service Oil Co. have completed their 1 William Blair, west offset (2,630 ft.) to their discovery well of Bryans Mill field.

In Wood County, Pan American Petroleum Corp. has completed its 1 Niendorff, 4,000 ft. northeast of its discovery well of West Yantis field.

The Bryans Mill confirmation well has a calculated open-flow potential of 43 M.M.c.f.d. of gas, recovering 206 bbl. of 54.5°-gravity condensate per M.M.c.f. from Smackover perforations at 10,256-10,328 ft. Shut-in pressure is 3,000 psi.

Potential exceeds that of the discovery well, 1 Allsup, rated at 22 M.M.c.f.d. with 233 bbl. of condensate per M.M.c.f. The same operators also have another well waiting on potential tests. It is their 1 Latham, a southeast offset to the discovery well.

Since completion of the discovery well last March, three long stepouts have been drilled. All were dry.

Pan American's West Yantis confirmation well flowed at the rate of 5 M.M.c.f.d. of gas with a gas-liquid ratio of 5,370 cu. ft. per bbl. Flow was gaged through 22/64-in. choke. Its pay, also in Smackover lime, is perforated at 12,840-90 ft.

Discovery well, 1 McKee, was completed last June with a calculated open-flow potential of 9,100 M.c.f.d. of gas with gas-liquid ratio of 8,230 cu. ft. per bbl. It is perforated at 12,770-12,820 ft.

Texas oil field yields gas condensate

Gas-condensate production has been opened in the previously prolific oil-productive Rich Ranch field in Liberty County, Texas Gulf Coast.

The new discovery is off the southwest side of the present oil-producing area, opened last year by Shell Oil Co. Nearest well the discovery producer, 1 Bill Daniel, 2,650 ft. northeast.

Production of the new well (1 Eli Rich) is from two deeper pays, one perforated at 14,657-76 ft., and the other at 13,634-47 ft. The lower zone flowed at the rate of 2 M.M.c.f.d. of wet gas through ¼-in. choke. Calculate open flow is 26 M.M.c.f.d.

The upper pay is rated at 40 M.M.c.f.d., open flow. Flow through ¼-in. choke was at the rate of 5 M.M.c.f.d. under 7,000 psi.

Discovery well is productive from Yegua sands at 11,085-89 ft. and 11,105-27 ft. It flowed 345 bbl. of 49°-gravity oil daily at completion.

Texas' East Tyler tops new Paluxy pay

New Paluxy production has been found in the South Tyler area of Smith County, East Texas.

Discovery well, drilled by Delta Drilling Co. and Claud B. Hamill is only 4,000 ft. from other Paluxy production in the area but is believed to be separated by a narrow graben.

It is a quarter mile north of a Rodessa producing area.

The well, 1 Ella Knight unit, is pumping 118 bbl. of 25°-gravity oil daily. Pay is perforated at 7,479-84 ft.

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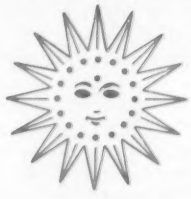

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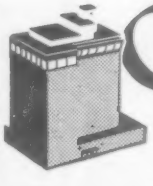

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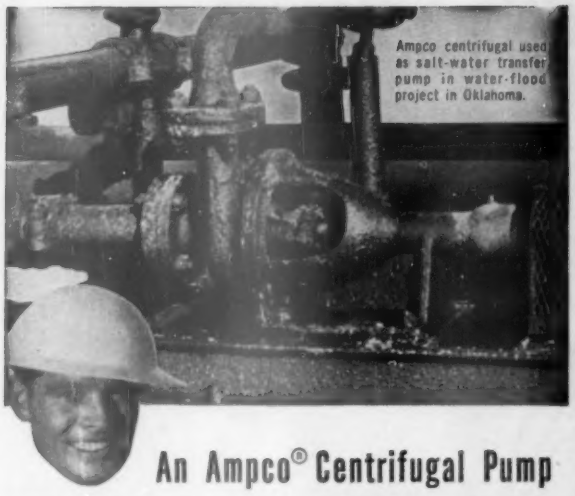

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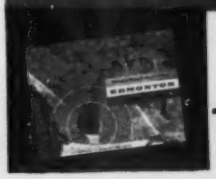

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BY PETER B. BIKE
Geophysical Editor

ROLLING SNIFFER checks for gas leaks as it travels 3 m.p.h. The arms attached to the air-intake funnels can be positioned from inside the vehicle. In the rear of the jeep is an operator who checks on the instrument recordings.

IT'S NOT SURPRISING when a geophysical company delves into the broad phases of the electronics field for diversification. It's a natural wedding of experience, facilities, and talent. Geophysical instrumentation techniques have been adapted to the electronics field for more than two decades.

How then, does a geophysical firm successfully enter a new line of endeavor? Rayflex Exploration Co. of Dallas provides an example.

In 1957, a need was seen by that company's management to supplement the diminishing income from seismic contracting. Simply, exploration activity was falling off. A new source of revenue was needed.

After looking around at several pos-

sibilities, a merger was effected with Scientific Service Laboratories, Inc., Dallas, in July 1959. SSL was a company which designed and manufactured electronic equipment and had a great deal of electronic know-how. The firm had a number of products covered by patents which were salable.

A prime effort was the development of Leak-Search, an instrument which could detect gas leaks at the surface. It was especially adapted for gas mains of public utilities. The basic patents dealt with infrared analyzers, and a license was obtained from Consolidated Edison Co. to use its patents. Further development included 18 patent applications by Rayflex covering the system now in use.

The theory involved in the Leak-Search system is, when a leak develops in a line beneath the surface, escaping gas passes through the soil and is diffused in the air at the surface. The concentration of methane in the atmosphere is determined to a large extent by the size of the leak in the pipe. The detection equipment is jeep-mounted, and the unit travels at a rate of about 3 m.p.h. adjacent to or immediately over underground gas lines. The air near the surface of the ground is continually sampled. The sample passes through various filters to the infrared analyzer sensitized to methane, and then on to a recorder which makes a paper record of the survey.

Methane anomalies associated with gas leaks are indicated on the records, and the gas company can determine from the amount of deflection indicated the approximate size of the leak. The largest leaks are repaired first and later the lesser ones.

An interesting observation is noted in that it was initially considered that the gas came to the surface through cracks and joints in the pavement. There have been several cases where gas has passed through the concrete. This is verified by discolorations in the concrete, and it is quite likely that the aggregate mixture is directly related to the concrete's permeability.

In April 1960, the first unit was sent to the field and worked for Houston Natural Gas Co. Since then, other companies who have used the service include Pioneer Natural Gas Co., Mississippi-Valley Gas Co., Republic Natural Gas Co., Northern Illinois Gas Co., and Southern Union Gas Co. Eight units have already been built, and 10 more are proposed in the near future. Average costs are about $10 per mile.

Although Leak-Search and the other new products being developed offer Rayflex a new avenue of pursuit, the firm will continue active in the geophysical-contracting end of the business. It is still seeking more geophysical clients but is simply spreading its base so that the firm can continue to progress in the present economic climate.

Louisiana's Calcasieu Lake field extended

A 1-mile extension has been marked up for the old Big Lake field on the east shore of Calcasieu Lake in northern Cameron Parish, South Louisiana.

It is southeast of previous productive limits of the field where Pan-American Petroleum Corp. found 22 ft. of net pay, topped at 13,364 ft., in its 1-A First National Bank of Lake Charles.

The well was drilled to 14,000 ft., and then plugged back to 13,630 ft. for completion. On a 2-hour state potential test it flowed at the rate of 265.56 bbl. of oil and 2,300 M.c.f.d. of gas. Test-flow was through 12/64-in. choke, registering pressure of 3,900 psi.

Big Lake field was opened in 1935 and now has nearly 20 wells in Anaguac and Frio sands. Pay of the new extension producer is in the Camerina A sand.

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Two states figure in Illinois basin activity

In Jefferson County, Illinois, M. D. Burkett and J. T. Hurt 1 Silas E. Brookman in NW SW NW 3-2s-4e, 8 miles northeast of Mount Vernon, flowed 156 bbl. of oil in 22 hours natural from McClosky lime through casing at 2,932-37 ft.

The well now averages about 180 bbl. of oil per day.

Edwards County. Alva C. Davis has set casing at 1 James J. Briggs et al. in SE SW SE 19-1s-14w, 2 miles east of Bone Gap. The operator will test O'Hara lime at 3,048-54 ft. and Rosiclare lime at 3,062-67 ft. A drill-stem test at 3,048-62 ft. got 120 ft. of clean oil, 30 ft. of heavily oil and gas-mixed mud. A test at 3,062-72 ft. got 105 ft. of oil, 5 ft. of heavily oil-mixed mud, and 10 ft. of salt water.

White County. National Associated Petroleum Corp. 1 Frank Bisch in NW NW SW 36-3s-10e, 4 miles southwest of Grayville, was completed on pump for 146 bbl. of oil and 25 bbl. of water per day after fracture in the Aux Vases sand at 3,052-70 ft.

Indiana. In Posey County, 7 miles southwest of Mount Vernon, F. E. Anderson & Son 2 Rosa Lawrence in NW SW SE 5-8s-14w, flowed 960 bbl. per day from Aux Vases sand at 2,649-67 ft.

The 1 Vollmer in SE NE NE 7-8s-14w, ¾-mile southwest extension from the Lawrence well, is on pump. The operators are Hoffman et al. Before being on pump it flowed 6 bbl. per hour, natural, from Aux Vases at 2,690-2,710 ft.

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Deep test slated for Central Arkansas

Little-explored Central Arkansas is to have a deep test for oil or gas. Location for the remote wildcat is in Lonoke County, 5½ miles northwest of England and 14½ miles southeast of Little Rock. Projected depth is 10,000 ft.

Nearest production of any is more than 60 miles northwest in Quitman gas field, in southeastern Cleburne County, the present most easterly productive spot of Arkoma basin. Location is still farther from southern Arkansas' producing areas. It is more than 30 miles from the nearest deep test.

Drilling will be a joint operation of Geochemical Surveys, of Abilene, Tex., and Sonat, Inc., Birmingham, Ala. Spot location of the test, 1 J. W. Cook, is in 18-1s-9w. Fleet Drilling Co., of Ada, Okla., will make the hole.

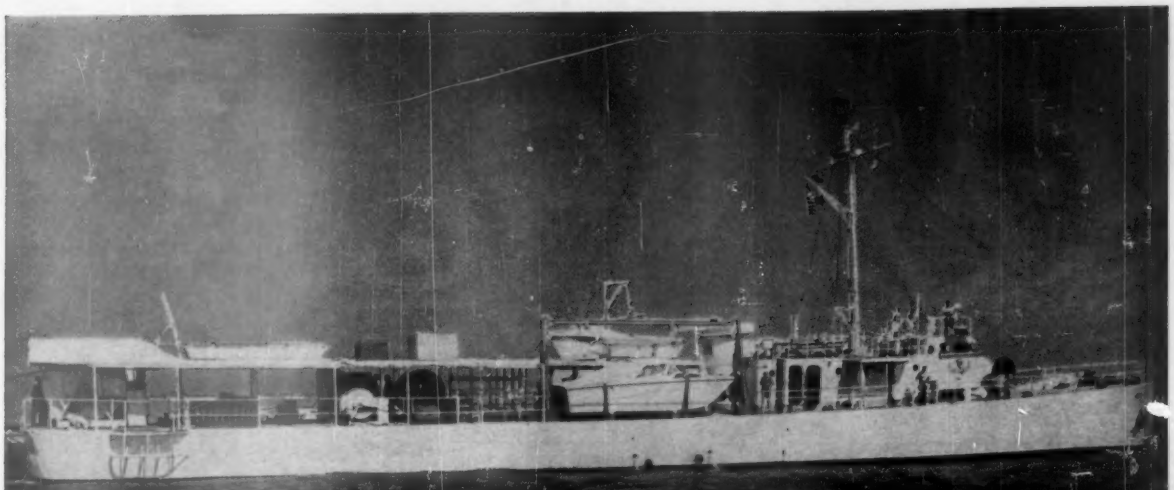
Kansas field gains Mississippian extension

An extension well ½ mile south of Moorhouse field in Kingman County, Sedgwick basin, Kansas, made 33 bbl. of oil per day. It is Drillers Production Co. 1 Kostner in NE NE NE 30-28s-5w.

Production is from open-hole section in the Mississippian at 3,886-92 ft.

Arbuckle. Tennessee Gas & Oil Co. confirmed Arbuckle oil production in a new field along the Reno-Rice County line. The 1 Fair in NE NE NW 4-22s-9w, Reno County, south offset to the discovery well just across the line in Rice County, is going on pump. The discovery well is Thunderbird Drilling Co., Inc. 1 Wellman "I" in SE SE SW 33-21s-9w. It pumped 110 bbl. of oil in 10 hours from Arbuckle open hole at 3,530-35 ft.

Rooks County. John O. Farmer, Inc., has a new discovery 1 mile southwest of Plainsville in Rooks County.



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The 1 Collins, N½ SW SE 34-9s-18w, pumped 81 bbl. of oil per day from Simpson Ordovician at 3,659-62 ft. Location is 2 miles east of North Williams field.

Butler County. J. A. Allison has a new Mississippian oil discovery at 1 Lucas in NW SW NW 1-27s-7e, 7 miles northeast of Leon, Kans. The well got oil at 2,751-67 ft.

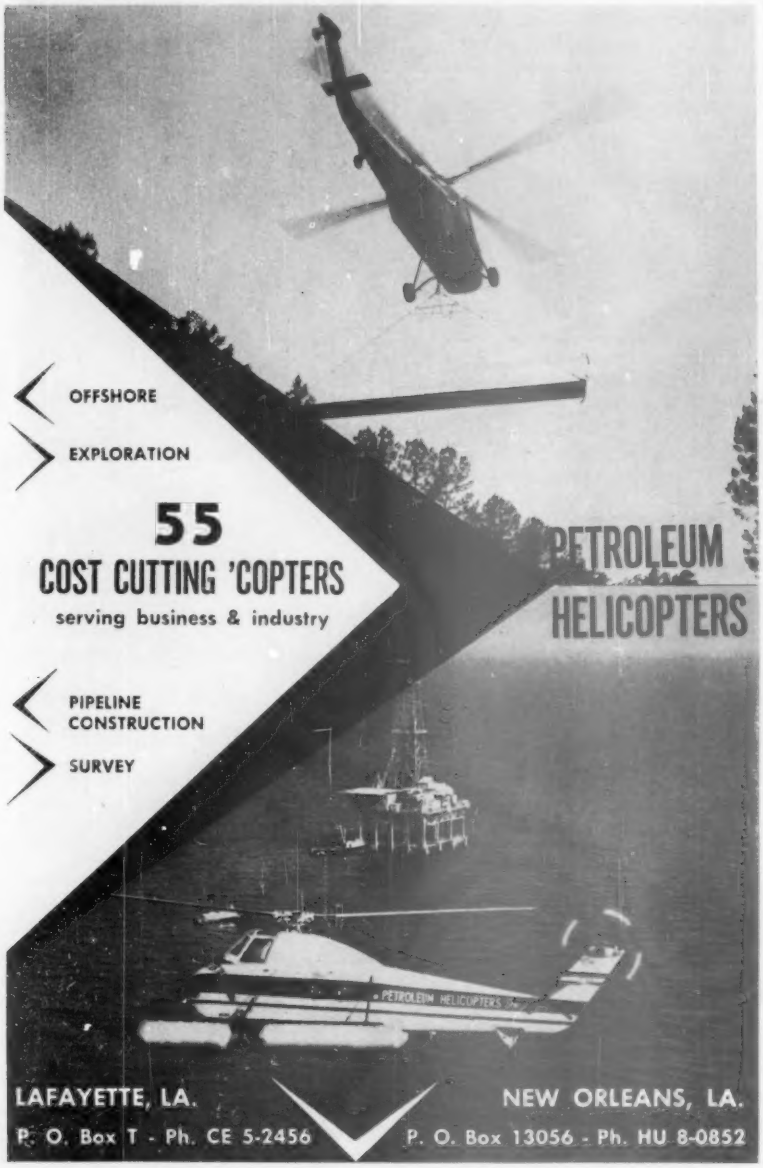
Oklahoma's Harper County gets Morrow discovery

A Morrow gas discovery is reported in Harper County, northwestern Oklahoma. The well is Sinclair Oil & Gas Co. 1 Freda A. Yauk in C NE SW 22-28n-21w, 3 miles northwest of North Lovedale pool.

A drill-stem test at 5,718-51 ft. got 7,876 M.c.f.d. in 5 minutes, 7,496 ft. after 10 minutes with a heavy condensate spray, stabilizing at that rate for the rest of the test period.

Oil produced in Texas gas-field area

New oil production has been opened in the gas-rich multiple-pay Mercedes area of Hidalgo County, in Texas' Rio Grande Valley.



The discovery is by Hydrocarbon Production Co., Inc., at its 1-A Lawson Lacy, completed with a flow of 170 bbl. of 50.7°-gravity oil daily. Flow was tested through ⅛-in. choke. Flowing pressure was 1,425 psi. Gas-oil ratio was 873 cu. ft. per barrel.

Production is from a 7,500-ft. Frio-Vicksburg sand.

A lease just east is gas-productive from seven sands in two wells drilled by A. W. Gregg.

New find for Texas' East Sarah White field

New importance is attached to the spreading East Sarah White field of Galveston County, on the Texas Gulf Coast, by the completion of a new-pay discovery well 1¼ miles northeast of nearest production.

The new well, Texas Eastern Transmission Corp.'s 1 Sarah White East Gas unit III, brings the boundary of the field to within a mile of Hitchcock townsite.

Pay zone, designated as Frio No. 2 sand, is perforated at 9,503-11 ft. Gas flow rates ranged from 1,333 M.c.f.d. through 8/64-in. choke with pressure of 5,328 psi. to 2,500 M.c.f.d. through 11/64-in. choke with pressure of 5,059 psi.

Open-flow potential is rated at 18,500 M.c.f.d. Liquid (46.4°-gravity condensate) content is in the ratio of 7,239 cu. ft. of gas per barrel.

Another driller enters Arkoma play

A new wildcat being drilled in Pope County, northwestern Arkansas, marks the debut of Sinclair Oil & Gas Co. to the ever-widening gas exploration in Arkoma basin.

Sinclair's initial drilling operation is 2¾ miles southeast of Hector. It is 5 miles southeast of Scottsville field, and 6¾ miles northwest of Jerusalem field, nearest production. Spot is in 8-9n-18w.

The test, 1 Richard Hogan, is scheduled to go to 3,000 ft., which should take it to the Hale sand, one of the two gas-productive zones at Scottsville. Jerusalem field produces from Atoka sand, which also is productive at Scottsville.

At Scottsville, Murphy Corp., discovery company, is getting started on its second test, 1 Lillie Frost unit. It is a south offset to the discovery well.

Discovery well, 1 S. E. Lee Estate, was completed last August. Its Hale sand is perforated at 1,936-47 ft. Atoka sand perforations are at 1,739-48 ft.

Gulf's Sugar Valley adds gas-condensate pay

The large multiple-pay Sugar Valley field in northeastern Matagorda County, on the Texas Gulf Coast, has another gas-condensate pay.

It is the Frio-Truitt sand, perforated at 9,448-58 ft. The new discovery well, 1 Martha Fields, drilled by M. P. S. Production Co. and Van Dyke & Mejlaender, flowed at the rate of 1,256 M.c.f. of gas and 9 bbl. of 47°-gravity condensate per day through 11/64-in. choke.

Absolute open-flow potential is placed at 3,450 M.c.f.d. of gas. Shut-in tubing pressure is 2,993 psi.

Duval discovery well completed in SW Texas

A new discovery well a mile southwest of San Diego, in eastern Duval County, Southwest Texas, is being completed as one of the county's richest gas producers. Open-flow potential is 40 M.M.c.f.d. of gas with a condensate yield of 23 bbl. per M.M.c.f. Gravity of the liquid is 60°.

The discovery was made by J. W. Gorman at his 2 Oliveiria, Jr. Gorman's first test, 1,300 ft. southeast, was dry. The new production is from a 6-ft. perforated interval at 5,091-97 ft. in hole drilled to 5,138 ft. It is shut in with tubing pressure of 1,927 psi.

Discovery finaled in West Central Texas

A dual completion and a new Mississippian discovery in a lower zone is reported at Harding Brothers 1 L. O. Cunningham, 2 miles southwest of Eliasville in Stephens County, Texas.

The discovery zone is from Mississippian through open hole at 4,233-66 ft. Flow was 135 bbl. per day on 10/64-in. choke. The lower cone is the upper Caddo at 3,268½-71½ ft. Pump got 36 bbl. per day plus 10% water. The completion will be put in the Stephens County Refular field area and the discovery zone will have a new-field designation. Operators have requested the name of Harbros for the field for the new pay. Location is in Section 1210 of the TE&L Survey.

Jones County. A new pay discovery was completed at D. D. Strange 1 A. A. Hayden, 2 miles north of Hawley town site. The well pumped 80 bbl. per day through 2-in. tubing set at 2,020 ft. This is a reentry hole, formerly a 2,570-ft. failure. Location

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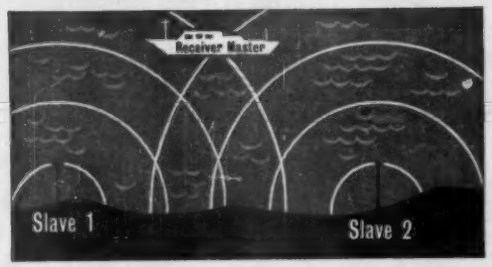

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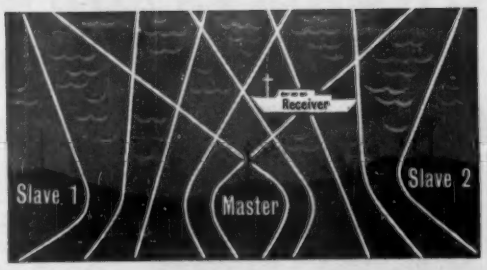

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is in the G. Martinez Survey 195. Location is 1 mile northeast of Tannehill production.

Menard County. Cisco sand pay was opened 12 miles northeast of Fort McKavett in Menard County. The well is Thomas Drilling Corp. et al. 1 Elizabeth Holliday et al.

Pump potential was 14 bbl. of oil plus 88% water from Cisco sand open hole at 1,910-13 ft. Site is in Section 7, Block 2, TW&GN Survey.

Deep Sheffield Channel wildcat flows gas

Mobil Oil Co. 1 Banner-State, 15,000-ft. wildcat in Terrell County, West Texas, 29 miles northeast of Dryden, flowed from 15-20 M.c.f.d. during test of the Ellenburger topped at 13,310 ft. The wildcat is 2 miles east of Brown-Bassett field and in Section 332, TW&NG Survey.

Andrews County wildcat flows Ellenburger oil in West Texas

An Ellenburger Cambro-Ordovician discovery is reported in Andrews County, West Texas. Texaco Inc. 9-CB State of Texas, northeastern Andrews County wildcat, 7 miles northeast of Andrews, is below 13,936 ft. after flowing oil on a drill-stem test.

Flow was 146 bbl. of oil in 2 hours and 25 minutes, reversing out 118 bbl. of oil. The test was at 13,904-36 ft. Recovery was 720 ft. of mud-cut water. Flowing pressures ranged from 3,143 to 5,548 psi. and shut-in pressure was 5,560 psi. in 30 minutes.

A test in the Devonian at 12,160-12,320 ft. got 360 ft. of gas in drill pipe, 6 ft. of oil, 1,500 ft. of oil and gas-cut water blanket and 60 ft. of heavily oil and gas-cut mud. Flow pressure ranged from 850 to 875 psi. and 30-minute shut-in pressure was 3,735 psi.

Location is in Section 32, Block 4, University Lands Survey, 5 miles west of Ellenburger oil at Magutex field. It is surrounded by Queen sand production in McFarland field.

North Texas. Humble Oil & Refining Co. 1 Grady Parmelly "B" was finished as a new pay discovery from the upper zone of the Goen lime in Taylor County. This test was originally completed opening up Flippen sand pay in East Inkum Cook field. It now has been dually completed in the Goen. The new pay discovery is 3½ miles southwest of View in central Taylor County.

The well pumped 17 bbl. of oil per day from perforations in the Goen lime at 4,866-69 ft. From Flippen sand the well flowed 171 bbl. per day at 2,929-39 ft. Location is 1½ miles south of the Frederckson area, nearest comparable oil. It lies in Section 6, Block 2, SPRR Survey.

Alaska logs are available

TWO SOURCES of Alaskan logs which will be made available to state operators have been announced. It was reported in Anchorage that Standard Oil Co. of California has decided to make logs of development wells drilled by the firm available 3 months after completion of the ventures. This will be released through an Anchorage printing firm.

Almost at the same time, American Stratigraphic Co., whose home offices are in Denver, stated that the company has completed stratigraphic studies on five Alaskan wells and the logs are available. The wells are 1 Titaluk, 1 Grandstand, 1 Knifeblade, A-2 Knifeblade (all in Naval Petroleum Reserve No. 4), and Benedum-Trees & Associates 1 Nulato. The last well was drilled in West Central Alaska. Logs can be obtained from Amstrat's Fairbanks office.

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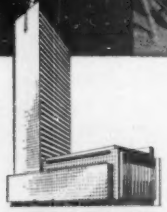

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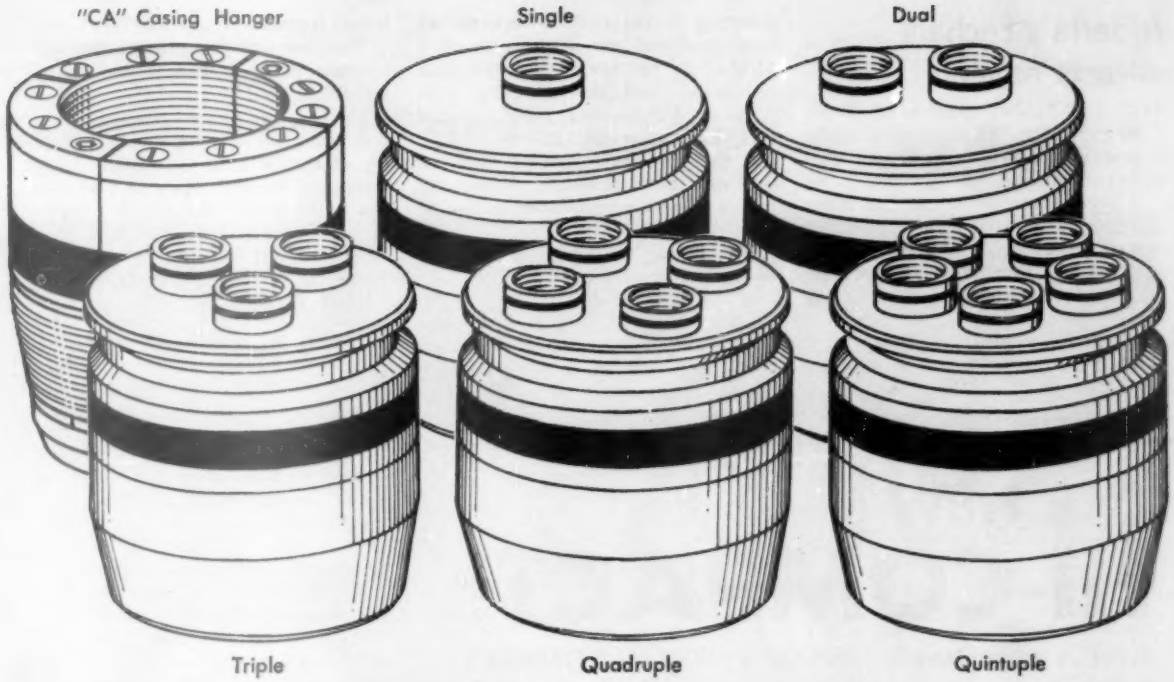

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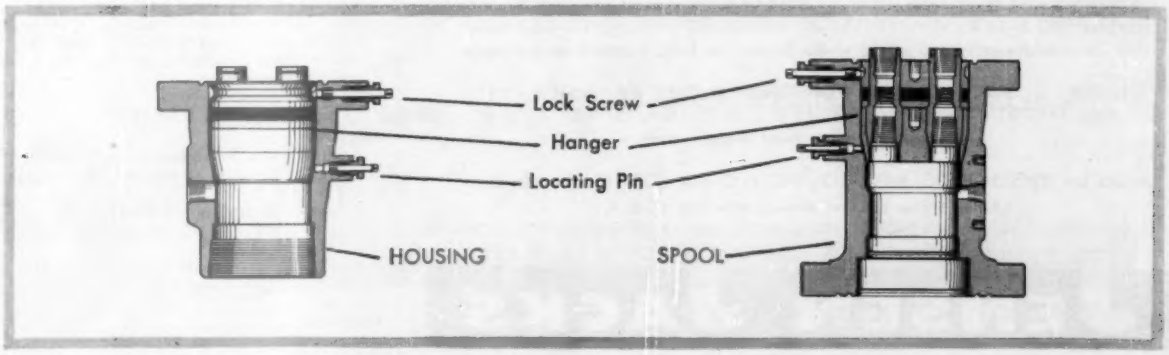

Alberta's Enchant attracts notice

THE ENCHANT AREA of South Central Alberta is fast shaping up as a prolific natural-gas-producing area of the province.

A second successful test was made by Omega Natural Gas Co., Ltd., with the discovery of Bow Island sand gas at the Omega Enchant-7 well, about 45 miles northeast of Lethbridge.

Omega previously completed a well, 7-6, which produced gas at the rate of 8,500 M.c.f.d. The new well, a followup to the first, is reported to have produced gas at the rate of 3 M.M.c.f.d., but testing has not been completed, and the company proposes to drill another 1,000 ft. to a total depth of about 3,500 ft.

A company spokesman indicated the well may be a dual-zone or possibly even a triple-zone producer, similar to the first discovery.

The gas was encountered at the interval of from 2,675 to 2,705 ft.

It is believed gas may also be present in the Blairmore formation.

The well is 1¼ miles north of the first well, a triple-zone producer—having encountered gas in two Bow Island foramtions and the Blairmore.

The new well is on the border line between being a wildcat and a development well.

Existing Enchant gas production has now been tied into the Pincher Creek leg of the Alberta Gas Trunk Line. Canadian Western Natural Gas also has a line in the area, which supplies the town of Enchant.

A team of companies headed by Home Oil Co., Ltd., also made a substantial gas discovery in the Enchant area.

New Louisiana strike links two fields

A newly completed Tuscaloosa discovery well in southeastern Tensas Parish, northeastern Louisiana, splits the 3-mile gap between Locust Ridge field, on the southwest, and the newer St. Joseph field, on the northeast.

It is Jet Drilling Co., Inc.'s and Phillips Petroleum Co.'s 1 Tensas Burial & Benefit Association, which flowed at the rate of 184 bbl. of 38.8°-gravity oil daily through 9/64-in. choke.

Completion is in Massive sand of the Lower Tuscaloosa where the well has 33 ft. of effective oil sand. Perforated interval is 9,129-39 ft. Total depth is 9,207 ft.

St. Joseph field produces 38.6°-gravity oil from Lower Tuscaloosa sand. Locust Ridge is productive of 43°-gravity oil from the Tuscaloosa-Pilot sand, and 40°-gravity oil from the Massive. There are dry holes between the new discovery and Locust Ridge field, but none between it and St. Joseph.

Discovery wells

ARKANSAS

Union County:

H. T. Pannell 1 Mitchell, SE SW SW 7-16s-15w. IPP 108 BOPD, 43.7°, perf. 4,057-60 ft., Cotton Valley. TD 4,205 ft. Opens new Cotton Valley area in Smackover field.

CALIFORNIA

Colusa County:

Occidental Petroleum Corp. 1 Sachreiter, center of SE¼ 4-14n-1w, flowed at rate of 12,470 M.c.f.d. through 7/16-in. choke from 7,645-56 ft., TD 8,263 ft. New Upper Cretaceous gas discovery in West Grimes area.

WESTERN CANADA

Alberta:

Kewanee 4-29 Inverness, LSD 4, 29-68-10w5. Beaverhill Lake oil discovery. TD 8,935 ft.

Calstan-CPR 3-17 North Bantry, LSD 3, 17-18-13w4. Bow Island gas discovery. TD 3,354 ft.

Can-Pacific 7-5 Lake McGregory, LSD 7, 5-16-21w4. Capped gasser. TD 4,819 ft.

Manitoba:

(Continued on page 225)

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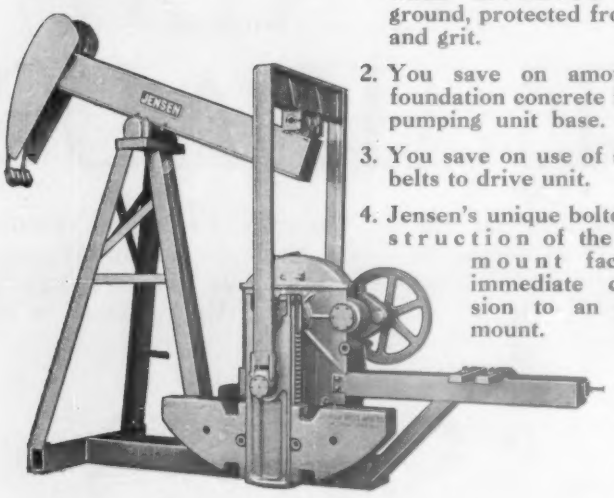

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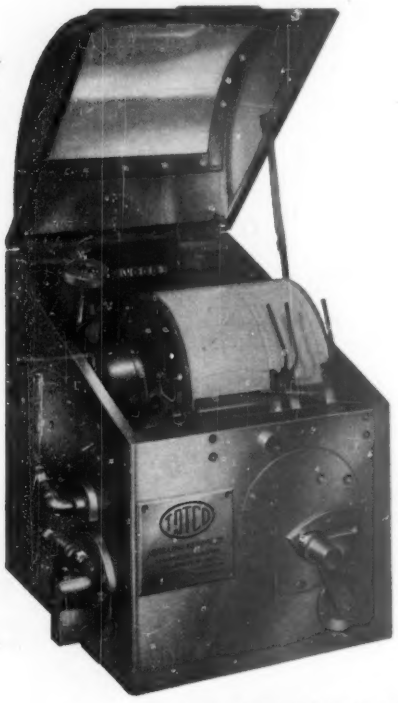

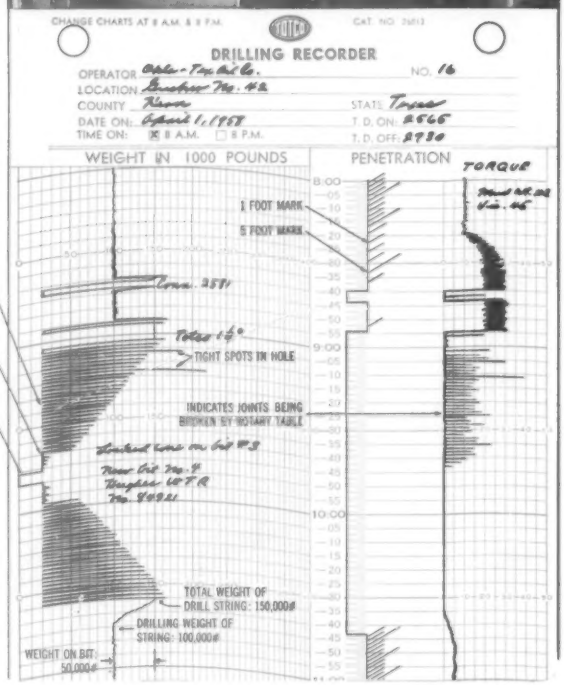

TECHNICAL OIL TOOL *Corporation*

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EXCLUSIVE DISTRIBUTORS:

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November well data in Canada

	TOTAL WELLS							WILDCATS					
	Total	Oil	Gas	Dry	Service	Footage	Cum. 1960	Total	Oil	Gas	Dry	Footage	Cum. 1960
Western Canada	**163**	**110**	**11**	**41**	**1**	**904,212**	**2,207**	**36**	**6**	**4**	**26**	**223,995**	**574**
Alberta	102	64	9	28	1	653,827	1,494	22	2	3	17	151,014	381
Saskatchewan	48	39	0	9	0	194,577	511	8	2	0	6	33,938	108
Manitoba	9	7	0	2	0	22,454	63	3	2	0	1	10,244	11
British Columbia	3	0	2	1	0	25,350	124	2	0	1	1	20,805	59
Northwest Territories	1	0	0	1	0	8,004	15	1	0	0	1	8,004	15
Ontario	35	6	16	9	4	44,584	278	..	..	..	..	.....	...

Michigan breaks drought with three wildcats

Three widely separated wildcats perked interest in Michigan to break a comparatively extended period of negative results in exploration off proved areas.

Union, Perry, and Perry 1 Gibson, SE SE NE 23-20n-9w, Osceola County, tested estimated 3,500 M.c.f. gas in Michigan Stray sand section between 1,670 and 1,743 ft. Drilling is going ahead for the 4,300-ft. Reed City section. The wildcat is 10 miles east of Burdell pool and about the same distance southwest of McBain pool.

Miller Brothers 1 Kurbatov, SW SW SE 12-16n-17w, Weare Township, Oceana County, 4 miles east of Pentwater field, was estimated good for 10 to 20 bbl. oil per day on preliminary in the Traverse line.

McClure Oil Co. 1 Preston, SE NW SE 23-5s-5e, Macon Township, Lenawee County, 10 miles northwest of the old Deerfield Trenton oil pool, carried 30 M.c.f.d. of gas and 100 ft. oil-cut mud on drill-stem in the Trenton at 2,600 to 2,827 ft. The well is being deepened but will be tested. Location is 40 miles east of the Albion-Scipio trend.

Humble will drill second test in Lake County, Oregon

Humble Oil & Refining Co. recently announced plans to drill a second well within its major 500,000-acre Lake County, Oregon, lease block. The well location falls approximately 4 miles south of Lakeview in Section 2-40s-20e.

In October, Humble abandoned their 1 Thomas Creek unit III, projected 12,000-ft. pre-Tertiary test at 12,093 ft. The well reportedly bottomed in lower Tertiary volcanics. This was the first test drilled within the block by Humble approximately 22 miles northwest of Lakeview.

The Humble lease block covers a major northwest-southeast anticline developed in lower and middle Tertiary volcanics which are a part of the Columbia-Modoc Plateau lavas which cover parts of Oregon, Washington, Idaho, Nevada, and northern California.

Washington activity. Sunshine Mining Co. and joint operators, Cascade Natural Gas Co. (Seattle) and Natural Gas Transmission Co. (Edmonton) will shortly spud their fourth well in recent months in their current program to establish commercial production in the Ocean City area of western Grays Harbor County, Washington. Their last attempt, 1-A Oscar, was recently abandoned at 4,137 ft. because of hole troubles. Their new location falls approximately 1 mile east of Sunshine's 1957 Washington discovery well, 1 Medina (15-18n-12w), in 14-18n-12w.

Sunshine et al. continues to work on their possible new field discovery, 1-A Rayonier, approximately 12 miles north of the Ocean City area. While the well has made small amounts of oil on short-duration production tests, the completed zone continues to give up mud and sand which has plugged the tubing. The operators are currently engaged in retesting selective zones to determine the interval or intervals that are making sand.

The operator's second well, 1 Oscar, which followed the 1-A Rayonier, is currently idle and waiting on a service rig for production testing. The well was drilled to 5,270 ft. Production casing was then ran to 3,691 ft. and perforated at unknown intervals. No data has been released on this well.

Saskatchewan's Eureka-Dodsland providing much light-gravity oil

EUREKA-DODSLAND—an area of southwestern Saskatchewan not far removed from the original site of the first light-gravity oil discovery in the province—has moved into the industry as a sizable source of light-gravity oil. Sarcee Petroleums, Ltd., and its subsidiaries, along with Canpet Exploration, Ltd., have been instrumental in the proving of sizable reserves of oil from the Viking sand formation in this area. General location of the region is 210 miles northwest of Regina and 28 miles east-northeast of Smiley oil field, Saskatchewan's first light-gravity oil-producing area.

Since its entry into drilling in the area in 1956-57, Sarcee and its partner in many but not all ventures, Canpet Exploration, have completed 80 wells. Entry for the drilling group was made with the drilling of seven wells on the eastern flank of the Eureka oil field. From the latter part of 1958 through 1960 a fairly continuous drilling program has been carried on. This project, active primarily in the summer months, was in conjunction with associates. Results showed 73 wells have been drilled. Two of these wells were sold, four have been suspended, eight were capped as potential gas wells and only three were abandoned as nonproductive. This leaves 56 Viking oil successes scattered throughout 5 separate townships and extending 18 miles east of the team's first wells.

Viking. Oil production at Eureka-Dodsland is from the Viking sand formation and underlying fragmental chert at a depth of 2,200-2,300 ft. The light-gravity crude, 36°, is a paraffin-base crude and is found in a gross pay zone of 26 to 31 ft. Following flush-flow production that has run well over 100 bbl. daily, the wells usually settle down to an average rate of 30 bbl. per day. The cost of drilling and completion, together with installation of pumps and production batteries, amounts to about $35,000 per well. Drilling time per well is 3 to 4 days and an average producer can pay out in 27 months after all costs and royalties. Several of the Canpet Sarcee group completions have reportedly paid out in 16, 17, and 23 months.

Market. A ready market exists for

November footage breakdown in the U. S.

	FIELD WELLS					WILDCAT WELLS			
	Oil	Cond.	Gas	Dry	Service	Oil	Cond.	Gas	Dry
Alabama									4,001
Alaska	44,015								3,215
Arizona			1,140	2,328					
Arkansas	76,725		20,610	37,477	1,700	4,003			29,566
California	416,737		73,432	58,379	871	4,307		12,155	88,193
Colorado	33,335	12,439	74,236	97,349		16,586		16,183	138,621
Illinois	136,541			79,810	153,769	12,527			71,117
Indiana	55,354		965	36,129	3,952	615			35,825
Kansas	451,632		45,674	208,895	72,448	43,319		29,092	210,156
Kentucky	72,409		110,831	86,156		2,732		537	29,920
Louisiana	900,503	298,780	96,412	467,922		2,190	24,508	2,042	286,244
North	160,052	9,418	87,292	141,712		2,190	10,508	2,042	70,858
South	467,825	214,623	9,120	307,380					187,829
Offshore	272,626	74,739		18,830			14,000		27,557
Michigan	122,599		11,006	83,984	870				67,450
Mississippi	167,264	11,241		73,035					161,499
Missouri									2,398
Montana	72,536		2,542	15,540		8,470			66,076
Nebraska	75,778			96,870		26,040			163,361
New Mexico	335,677	12,456	270,238	49,188	2,691	18,619			60,612
West	35,301	12,456	258,892	6,181	2,691				27,684
East	300,376		11,346	43,007		18,619			32,928
New York	10,840		3,140	3,933	7,997				2,284
North Dakota	21,890			17,039		3,411			45,936
Ohio	78,111		49,108	50,097	19,700	3,328			4,417
Oklahoma	536,657	17,335	171,617	235,649	73,295	89,179	12,977	5,609	108,701
Oregon									17,642
Pennsylvania	32,487		81,438	48,450	42,350				
South Dakota									9,368
Tennessee						2,000			10,806
Texas	2,140,746	525,050	192,287	863,189	95,966	88,451	48,354	36,544	917,266
Dist. 1	76,644	13,778	7,675	41,889	411		8,003		75,889
Dist. 2	69,043	98,519	42,185	60,888		11,450	6,053	5,310	82,452
Dist. 3	186,766	92,902	17,023	126,695		22,364	27,577	18,012	84,080
Dist. 4	126,432	44,072	48,325	80,375	2,648			3,501	128,188
East	268,181	46,473		106,125			6,721		98,414
Dist. 7-B	173,488		5,946	77,602	4,191	18,965		5,211	97,950
West	926,437	106,649	2,530	157,894	59,323	15,336			249,983
Dist. 9	171,778	33,848		164,865	29,393	20,336			80,884
Dist. 10	141,977	88,809	68,603	46,856				4,510	19,426
Utah	69,375		4,940		6,043			7,384	39,780
West Virginia	8,387		111,303	7,489					6,173
Wyoming	178,022		33,468	81,583		15,636		7,275	161,235
Total U. S.	**6,037,620**	**877,301**	**1,354,387**	**2,700,491**	**481,652**	**341,413**	**85,839**	**116,821**	**2,741,862**
Cum. 1960	71,334,663	10,586,004	13,255,665	32,526,547	4,147,236	4,027,334	936,529	1,562,452	33,699,790

. . . and in Canada

Western Canada	**569,560**		**34,804**	**70,298**	**5,555**	**26,593**		**18,821**	**17,581**
Alberta	411,094		30,259	55,905	5,555	14,327		14,556	122,131
Saskatchewan	148,458			12,191		7,522			26,406
Manitoba	10,008			2,202		4,744			5,500
British Columbia			4,545					4,265	16,540
Northwest Territories									8,004

the oil produced in this area and unlike many regions of western Canada there is no current restriction on production rates. The field area is serviced by pipeline facilities owned and operated by Royalite Oil Co., Ltd. Product brings a price of $2.42 per barrel at Coleville where it is blended with that field's heavy-crude yield to supply a medium-gravity crude to both western Canada and eastern Canada refiners.

Main operators. The Sarcee-Canpet group are not the only operators in this area but they are the main ones. Other companies have been drilling in recent months and during the coming months more wells will be drilled. In fact, in a rectangular area 4 miles wide and 18 miles long a total of 55 locations have been staked in the past couple of weeks. Thirty-nine of these well sites were selected by Sarcee and Canpet for drilling this year. New Continental Oil Co., Ltd., another Canadian independent, recently spudded its initial well in a 10-well program on Imperial Oil Limited farmout lands. Rounding out the long string of locations that will make Eureka-Dodsland one of the most active drilling areas of Saskatchewan in the next number of months are four well sites staked by Sun Oil Co. and a pair by United Cansco Oil & Gas.

Its ready market for crude produced, comparatively cheap, fast drilling, and better-than-average payout time, are some of the many factors favoring this significant oil-producing area.

November well tally in the U. S.

State—	Total completions									Cable-tool comp.	D.D.	Wildcats							
	Total	Oil	Cond.	Gas	Dry	Service	Footage	Cum. wells 1960	Cum. footage 1960			Total	Oil	Cond.	Gas	Dry	Footage	Cum. wells 1960	Cum. footage 1960
Alabama	2	0	0	0	2	0	4,001	41	417,821	0	0	2	0	0	0	2	4,001	6	30,369
Alaska	5	4	0	0	1	0	47,230	18	183,817	0	0	1	0	0	0	1	3,215	7	67,310
Arizona	3	0	0	1	2	0	3,468	30	65,036	0	0	0	0	0	0	0	0	19	44,134
Arkansas	52	27	0	4	20	1	170,081	550	1,972,997	0	0	10	1	0	0	9	33,569	137	523,796
California	159	112	0	16	30	1	654,074	1,513	6,809,445	2	8	22	1	0	3	18	104,655	274	1,576,222
Colorado	74	9	2	17	46	0	388,749	601	2,986,859	0	2	31	3	0	2	26	171,390	303	1,523,056
Florida	0	0	0	0	0	0	0	4	46,332	0	0	0	0	0	0	0	0	4	46,332
Idaho	0	0	0	0	0	0	0	1	1,182	0	0	0	0	0	0	0	0	1	1,182
Illinois	227	64	0	0	86	77	453,764	2,132	4,308,114	*35	3	47	5	0	0	42	83,644	450	834,910
Indiana	95	35	0	1	57	2	132,840	973	1,335,110	*61	1	27	1	0	0	26	36,440	347	428,502
Iowa	0	0	0	0	0	0	0	4	4,277	0	0	0	0	0	0	0	0	4	4,277
Kansas	461	241	0	25	138	57	1,061,216	3,759	11,174,371	180	0	71	10	0	6	55	282,567	945	3,516,199
Kentucky	207	74	0	43	90	0	302,585	1,977	2,670,964	*82	2	27	4	0	1	22	33,189	213	301,378
Louisiana	309	140	28	33	108	0	2,078,601	3,310	25,740,506	0	0	43	1	2	2	38	314,984	510	4,320,327
North	151	60	2	32	57	0	484,072	1,296	4,890,675	0	0	23	1	1	2	19	85,598	245	1,237,361
South	118	51	18	1	48	0	1,186,777	1,559	15,995,477	0	0	17	0	0	0	17	187,829	234	2,681,977
Offshore	40	29	8	0	3	0	407,52	455	4,854,354	0	0	3	0	1	0	2	41,557	3	400,989
Michigan	80	32	0	3	44	1	285,909	850	2,894,095	41	0	20	0	0	0	20	67,450	228	846,700
Mississippi	45	18	1	0	26	0	413,039	613	6,117,263	0	0	18	0	0	0	18	161,499	235	2,282,930
Missouri	2	0	0	0	2	0	2,398	29	47,037	2	0	2	0	0	0	2	2,398	29	47,037
Montana	38	13	0	1	24	0	165,164	312	1,463,380	4	0	18	1	0	0	17	74,546	146	607,391
Nebraska	68	21	0	0	47	0	362,049	802	4,415,743	0	1	34	4	0	0	30	189,401	353	1,898,068
Nevada	0	0	0	0	0	0	0	3	11,762	0	0	0	0	0	0	0	0	3	11,762
New Mexico	143	67	2	48	25	1	749,481	1,696	8,383,453	37	3	16	2	0	0	14	79,231	236	1,177,444
West	65	8	2	45	9	1	343,205	617	2,922,063	10	1	6	0	0	0	6	27,684	67	244,742
East	78	59	0	3	16	0	406,276	1,079	5,461,390	27	2	10	2	0	0	8	51,547	169	932,702
New York	20	8	0	1	4	7	28,194	275	466,467	20	0	1	0	0	0	1	2,284	40	139,684
North Carolina	0	0	0	0	0	0	0	3	4,896	0	0	0	0	0	0	0	0	3	4,896
North Dakota	14	5	0	0	9	0	88,276	262	1,673,714	0	0	8	1	0	0	7	49,347	76	456,572
Ohio	84	38	0	18	23	5	204,761	966	2,404,556	82	0	2	1	0	0	1	7,745	46	162,590
Oklahoma	382	194	3	32	106	47	1,251,019	4,196	15,567,239	112	0	44	13	1	1	29	216,466	635	3,262,573
Oregon	2	0	0	0	2	0	17,642	9	34,327	0	0	2	0	0	0	2	17,642	9	34,327
Pennsylvania	71	20	0	19	9	23	204,725	812	2,290,388	65	0	0	0	0	0	0	0	18	109,218
South Dakota	2	0	0	0	2	0	9,368	21	137,280	0	0	2	0	0	0	2	9,368	10	42,984
Tennessee	11	1	0	0	10	0	12,806	89	75,805	11	0	11	1	0	0	10	12,806	85	74,586
Texas	1,122	555	67	52	407	41	4,907,853	14,114	60,352,811	61	13	214	15	6	6	187	1,090,615	2,897	13,228,372
District 1	87	35	3	4	44	1	224,289	1,016	2,738,510	3	1	26	0	1	0	25	83,892	364	1,088,171
District 2	50	9	13	9	19	0	375,900	683	4,573,347	0	1	13	1	1	1	10	105,265	169	1,207,474
District 3	81	36	12	4	29	0	575,419	1,067	7,489,712	0	1	14	2	3	1	8	152,033	201	1,859,409
District 4	88	33	5	9	40	1	433,541	976	5,335,122	0	1	25	0	0	1	24	131,689	273	1,545,119
East (5 & 6)	127	79	8	0	40	0	525,914	1,187	5,493,896	0	0	22	0	1	0	21	105,135	246	1,330,191
District 7-B	124	63	0	4	55	2	383,353	1,992	5,674,096	0	0	35	5	0	2	28	122,126	562	1,712,880
West (7-C & 8)	295	174	11	1	87	22	1,518,152	3,617	18,135,218	23	8	56	3	0	0	53	265,319	573	2,626,062
District 9	189	89	5	0	80	15	501,104	2,621	6,591,438	35	1	20	4	0	0	16	101,220	456	1,440,673
District 10	81	37	10	21	13	0	370,181	955	4,321,472	0	0	3	0	0	1	2	23,936	53	418,393
Utah	22	11	0	2	8	1	127,522	215	1,216,611	0	0	9	0	0	1	8	47,164	81	456,943
Virginia	0	0	0	0	0	0	0	8	39,584	0	0	0	0	0	0	0	0	0	0
Washington	0	0	0	0	0	0	0	4	26,515	0	0	0	0	0	0	0	0	4	26,515
West Virginia	47	5	0	38	4	0	133,352	785	1,928,141	46	0	1	0	0	0	1	6,173	9	64,879
Wyoming	91	38	0	8	45	0	477,219	964	4,808,322	7	2	32	2	0	2	28	184,146	390	2,072,640
Total November 1960	**3,838**	**1,732**	**103**	**362**	**1,377**	**264**	**14,737,386**	**41,941**	**172,076,220**	**848**	**35**	**715**	**66**	**9**	**24**	**616**	**3,285,935**	**8,752**	**40,226,105**
Total October 1960	3,978	1,759	116	363	1,498	242	15,370,281	.....	.....	961	54	850	90	9	22	729	3,794,749	.....	.....
Cumulative 1960	**41,941**	**18,855**	**1,211**	**3,536**	**15,887**	**2,452**	**172,076,220**	.....	.....	**8,374**	**543**	**8,752**	**789**	**96**	**296**	**7,571**	**40,226,105**	.....	.....
Cumulative 1959	46,288	23,072	1,132	3,419	17,386	1,279	190,725,056	.....	.....	.....	.....	9,092	797	99	309	7,887	43,909,817	.....	.....

*Estimated.

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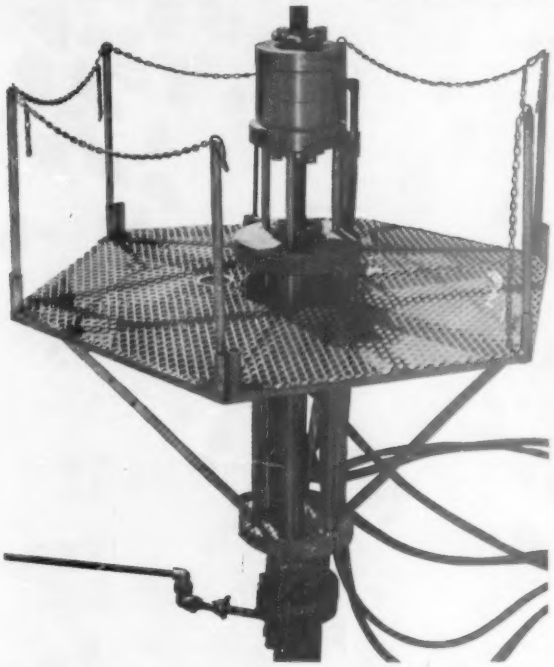
BROWN HYDRAULIC SNUBBER AND WORKOVER UNIT



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Some of the many operations you can perform under full pressure control with this versatile, money-saving unit:

1. Plugged pipe may be pulled, repaired and re-run.
2. Outside or inside cuts may be made to remove sections of pipe which have developed holes or become stuck.
3. You may wash over stuck pipe.
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6. A packer or retainer may be pulled safely while it swabs the hole.
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8. Sand bridges may be drilled out under pressure.
9. Parted tubing may be repaired under pressure.

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A remote hydraulic power source, control panel, and all auxiliary equipment is furnished – including a gin pole tall enough to handle a joint of tubing if necessary. Thus workover jobs can be done without moving in a complete rig.

Control Panel includes weight indicator and may be spotted at any convenient place. Hydraulic Power Supply may be located 100' from well for greater safety.

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HOUSTON 24, TEXAS

(Continued from page 216)

Texaco-BA 13-15 Souris, LSD 13, 15-6-22w1. Mississippian oil discovery. TD 2,174 ft.

Texaco 13-8 Souris, LSD 13, 8-6-22w1. Mississippian oil discovery. TD 2,570 ft.

Saskatchewan:

Sun 4-12 Shaunavon, LSD 4, 12-9-19w3. Potential Jurassic oil well. TD 4,543 ft.

COLORADO

Baca County:

Horizon Oil & Gas Co. 1-22 Cogburn, C NW NW 22-23s-42w. IPF 8,450 M.c.f.d., Topeka and Morrow at 4,031-56 and 4,654 ft., resp. TD 5,238 ft. Topeka and Morrow discovery, dual completion, new field.

Routt County, North Sage Creek:

Caswell Silver et al. 1 Featherstone-Federal, NE NE 23-5n-88w. IPP 32 BOPD, 40°, Niobrara discovery, new field. TD 5,590 ft. Niobrara open hole 4,944-5,590 ft. Pay at 5,496-5,590 ft.

Washington County:

Tipps Drilling Co. 1 Blake, OWWO, NW SW 3-2s-55w. IPP 105 BOPD, "J" sand discovery, new field. TD 4,998 ft. "J" sand discovery, new field.

NEBRASKA

Kimball County:

Chandler & Simpson 1 Eichenberger, OWWO, C SE NE 12-13n-57w. IPP 14½ BO, 80 BWPD, "J" sand 6,872½-75 ft. TD 6,960 ft. "J" sand discovery, new field.

NEW MEXICO

Lea County:

Cabeen Exploration Corp. 1-A White-State, OWPB, 5 miles northeast of Caprock in 15-10-32e. IPP 50 BO and 90 b.s. and w./24 hours, 43°, Hueco 8,366-8,718 ft. TD 10,850 ft. PBTD 8,800 ft. New oil discovery.

Gulf Oil Corp. 1 Austin Cook, 10 miles southeast of Lovington in 29-16s-38e. IPP 14 BOPD, 28.5°, San Andres open hole 5,089-5,375 ft. TD 9,100 ft. PBTD 5,375 ft. New oil discovery.

OHIO

Wayne County:

C. R. Obermiller 1 John Henderlong, Sec. 36, Canaan Twp. Cambro-Ordovician discovery. IOF 419 M.c.f.d. IRP 2,065. TD 5,713 ft.

EAST TEXAS

Anderson County:

Fairway Operating Co. 1 E. L. Maymon, Alfred Benge Sur., A-106, 2½ miles west of Frankston, IP 178 BOPD (net), 27 BWPD, 14/64-in., 47°, GOR 511 cu. ft. per bbl., TP 550 psi., perf. 9,868-88 ft. and 9,898-9,924 ft. James lime. TD 10,081 ft. Discovery well of West Fairway field.

Marion County:

Douglas Whitaker 2 R. S. Arnold, W. Lemmon Sur., 2 miles west of Lodi. IP 205 BOPD, 12/64-in., 41°, GOR 600 cu. ft. per bbl., TP 375 psi., perf. 6,252½-60 ft., Hill lime. TD 6,302 ft. New pay in Friendship field.

Smith County:

Javelin Oil Co., Inc., and Sklar Producing Co. 1 J. R. Olson, H. S. Davis Sur., A-288, 7 miles southeast of Tyler. Calculated open-flow potential 1,800 M.c.f.d., 12 BC per M.M.c.f., shut-in TP 2,482 psi., perf. 5,717-22 ft., Paluxy. TD 5,882 ft. Discovery well of South Chapel Hill field.

SOUTHWEST TEXAS

Jim Hogg County:

Arkansas Fuel Oil Corp. 1 Homero T. Martinez, Sec. 293, S. D. Walker Sur., A-342, 14 miles southwest of Hebbronville. IP 66 BOPD, 14/64-in., 45°, GOR 320 cu. ft. per bbl., TP 20-60 psi., perf. 3,587-90 ft., Yegua. TD 3,705 ft. New-field discovery 3 miles west of South Armstrong field.

Jim Wells County:

Tom Crews et al. 1 W. R. Wright et ux, Ross M. Bridges Sur., A-54, 12 miles north of Alice. AOF 8,400 M.c.f.d., dry gas, shut-in TP 879 psi., perf. 2,389½-91 ft., Heterostegina. TD 4,500 ft. New-field discovery 2½ miles southwest of Teresa field.

Wilson County:

Edgar & Slator 1 H. D. Hierholzer, Rafael Salinas Sur., A-288, 12 miles east of Pleasanton. IPP 7 BOPD (net), 85% water, 19°, perf. 1,097-1,112 ft., Reklaw. TD 1,222 ft. New-field discovery.

TEXAS GULF COAST

Calhoun County:

Superior Oil Co. 1-B Maude B. Traylor, Thomas Sutherland Sur., A-37, 5 miles southwest of Weedhaven, and 1½ miles northeast of Point Comfort field. AOF 5,650 M.c.f.d., GLR 24.3 M.c.f. per bbl., 51.5°, shut-in TP 6,510 psi., perf. 10,654-72 ft., Frio TD 14,579 ft. New field discovery.

Fort Bend County:

Tennessee Gas Transmission Co. 1 P. V. Cook Gas Unit, C. Fulshear League, A-29, 3 miles southwest of Fulshear. AOF 5,150 M.c.f.d., GLR 82.75 M.c.f. per bbl., 53.5°, shut-in TP 2,765 psi., perf. 8,245-53 ft., Frio. TF 8,441 ft. New pay in Random field.

Galveston County:

Union Oil Co. of California 1 Moody National Bank, Anthony Hatch Sur., A-88, 4 miles southeast of Kemah. IP 2 M.M.c.f.d. of gas, 10 BC per M.M.c.f., 12/64-in., TP 2,175 psi., perf. 9,640-55 ft., Frio. TD 10,365 ft. New-field discovery 1½ miles northeast of Dickinson field.

Jackson County:

Texaco Inc., 1 Hillyard Gas Unit O/A, Lot 68, Schwind & Mahers 2nd Addition to Francitas Farms, John D. Newell Sur., A-61, 3 miles south of Francitas. AOF 13,300 M.c.f.d., GLR 26.7 M.c.f. per bbl., 56.3°, shut-in TP 3,377 psi., perf. 8,964-68 ft. TD 10,500 ft. Discovery well of South Francitas field.

Karnes County:

Bright & Schiff 1 Kunkel, Don Erasmo Seguin Grant, A-10, 4 miles south of Falls City. IP 263 BOPD (net), 30% water, ¼-in., 38°, GOR 1,500 cu. ft. per bbl., TP 950 psi., perf. 10,940-50 ft., Edwards lime. TP 11,495 ft. Discovery well of Big John field.

Matagorda County:

Humble Oil & Refining Co. 1 Pierce Estate Oil & Gas Interest, Christopher G. Cox Sur., A-18, 4¾ miles southwest of Buckeye. AOF 19 M.M.c.f.d., GLR 51 M.c.f. per bbl., 49.6°, shut-in TP 7,325 psi., perf. 11,430-37 ft., Frio. TP 11,750 ft. New pay and extension (1 mile southeast) for Duncan Slough field.

Scurlock Oil Co. 1 Ada Irene Hurst, L. L. Veider Sur., A-97, 6 miles south of Bay City. AOF 6,600 M.c.f.d., GLR 25 M.c.f. per bbl., 58°, shut-in TP 3,260 psi., perf. 9,960-65 ft., 9,967-69 ft., and 9,670-72 ft., Frio. TP 10,012 ft. New-pay discovery ½ mile northwest of Wadsworth field.

Newton County:

Ada Oil Co. 1 W. O. Roy, H. A. Arledge Sur., A-910, 2 miles southeast of Call. IP 90.34 BOPD, ⅛-in., 44°, GOR 550 cu. ft. per bbl., TP 685 psi., perf. 6,842-45 ft. Yegua. TD 10,115 ft. Discovery well of Ada-Call field.

Nueces County:

John B. Hawley, Jr., 1 Joe Stelzig, Sec. 191, F. Z. Bishop Subd. of Palo Alto, 5 miles northwest of Bishop. IP 137 BOPD (net), 5% water, 8/64-in., 40.2°, GOR 980 cu. ft. per bbl., TP 875 psi., perf. 7,095-98 ft. TD 7,145 ft. Discovery well of East Stratton field.

Victoria County:

H. H. Howell, M. B. Rudman, Cecil J. Cox et al. 1 Annia Charbula, Block 54, Richey Land Co. Subd. of Roseborough Ranch, V. Garcia Grant, A-45, 4 miles southeast of Inez. AOF 12 M.c.f.d., dry gas, shut-in. TP 1,941 psi., perf. 5,493-98 ft., and 220 M.M.c.f.d., dry gas, shut-in pressure 1,661 psi., perf. 4,451-55 ft. TD 6,254 ft. Dual discovery well of South Inez field.

NORTH TEXAS

King County:

O. B. Kiel, Jr., 1-A Alexander Est., 6 miles east of Block F, Tannehill field. IPP 65 BOPD, 38°, GOR 300:1. Upper Tannehill sand 2,982-94 ft. TD 6,212 ft. PBTD 3,082 ft. New oil discovery.

WEST TEXAS

Andrews County:

Humble Oil & Refining Co. 1-BS State University, 23 miles west of Andrews in Sec. 29, Blk. 12, Univ. Lands Sur. IPF 254 BOPD, ¼-in. choke, 42.1°, GOR 112:1. TP 75 psi. packer. Ellenburger 11,075-90 ft. TD 11,124 ft. New oil discovery.

Crane County:

Brown & Thorp Oil Co. 1 Gulf-Moseley, 5 miles north of Girvin in Sec. 2, Blk. 31, H&TC Sur. IPF 85 BOPD, 18/64-in. choke, 39.2°, GOR 316:1, TP 350 psi. packer. Permian 3,062-74 and 3,084-90 ft. TD 5,386 ft. New oil discovery.

Gulf Oil Corp. 634 W. N. Waddell et al., 16 miles southwest of Crane in Sec. 7, Blk. 3, H&TC Sur. IPF 140 BOPD, plus 1% water, 16/64-in. choke, 45.6°, GOR 1,213:1, TP 465 psi., CP 1,025 psi. Devonian 5,655-5,725 ft. TD 6,120 ft. PBTD 6,068 ft. New oil discovery.

Garza County:

Continental Oil Co. 5 L. G. Thuett, 4 miles west of Post in Sur. 1, SF 1,439. IPP 143 BOPD, plus 5% water, 25°, GOR 170:1. Strawn 8,418-23 ft. TD 9,015 ft. PBTD 8,680 ft. New oil discovery.

WEST CENTRAL TEXAS

Stephens County:

Serene Oil Co. Inc. 1-A Robert Brown, 5 miles northeast of Crystal Falls in H. J. Cleveland Sur. IPF 88 BOPD, 16/64-in. choke, Caddo lime 3,328-48 ft., 40°, GOR 750:1, CP 200 psi. TP 80 psi. TD 4,305 ft. New oil discovery.

Throckmorton County:

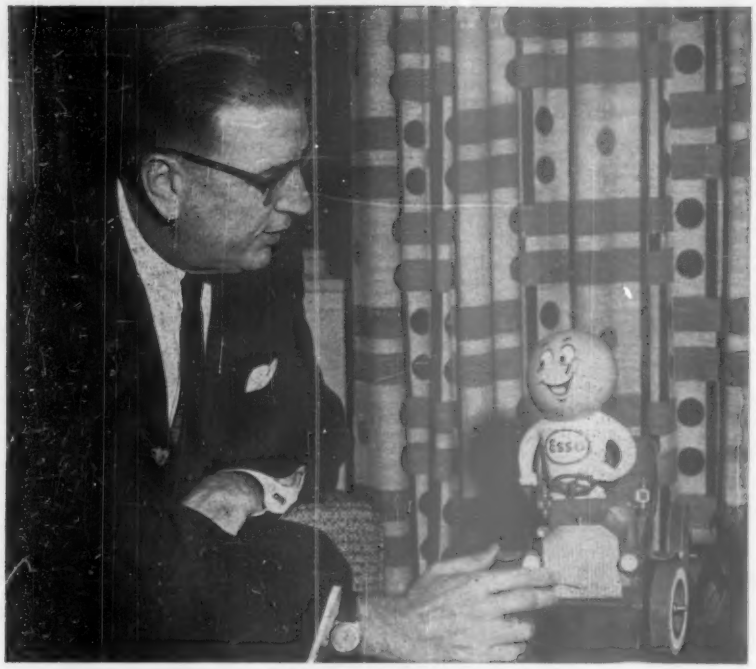
Sun Oil Co. 1 Martha Shelton, 14 miles south of Throckmorton in Sec. 653, TE&L Sur. IPP 7 BOPD, plus 59% water, 36.5°, 410-420 ft. TD 950 ft. New oil discovery.

UTAH

Grand County, Bryson Canyon:

Trend Oil Co. 1 Unit, SE SW 10-17s-24e. IPF Dakota 6,100 M.c.f.d., IPF Morrison 7,200 M.c.f.d. Dakota 4,264-4,392 ft.; Morrison 4,403-4,576 ft. TD 4,729 ft. Dual completion from Dakota and Morrison. New field.

(Continued on page 238)



William W. Bryan
. . . figures in fast executive changes.

Bryan Takes a Positive View

. . . in any debate on oil marketing. And the Esso official can draw on plenty of experience to make his points.

IF YOU WANT to hear what's wrong with the oil industry, particularly the marketing segment, don't come to William Wellington Bryan.

If you do, the long-time marketing man for Standard Oil Co. (N. J.) is likely to give you an earful. And it will be about what's right with an industry which he feels has performed an outstanding public service and owes apologies to no one (also see p. 90).

Bryan is full of his subject, having a background of 37 years in the business, all of it with the Jersey Standard group. He requires no prodding to rise to a defense of the industry he has served all of his adult life.

Jersey career . . . A native of Petersburg, Va., Bryan went to work for Esso Standard Oil Co. in 1923 as a construction helper at Richmond, Va. He was 17 at the time.

Later he worked as a mechanic, won a promotion to salesman, and became manager of Esso's Norfolk sales district in 1935. He moved to Richmond in 1943 as assistant manager of the Virginia-West Virginia sales division. In 1949 he was named manager of the important New Jersey sales division.

In 1953 Bryan left the domestic marketing scene briefly to handle a special assignment in France for the parent Jersey Standard. Returning to the U. S., at the end of the year he was assigned to Esso headquarters in New York as northern regional sales manager.

He moved again to Jersey Standard in February 1956 and in June of that year became assistant coordinator for North America in the marketing coordination department. The following November he was elected vice president in charge of marketing and a director of Carter Oil Co., now the Central Region of Humble Oil & Refining Co.

In another of Bryan's fast executive changes during the consolidation of various Jersey domestic subsidiaries, he was named vice president for marketing of Humble in Houston. Three and a half months later he was elected president of the Esso Standard Division.

In the latter position, an interim assignment, he expedited the consolidation under which Humble is emerging as Jersey's big domestic operating subsidiary.

Last week Bryan was made vice president of Esso Standard, Eastern Region, under the new Humble reorganization of operating divisions.

Teacher and handyman, too . . . Though he went to work while still in his teens, Bryan taught sales-management courses at the University of Richmond when he was assistant manager of the Virginia-West Virginia sales division.

He attended Harvard University's Graduate School of Business under the advanced management program.

Bryan is a man of wide interests, with "more hobbies than time." He considers himself an amateur photographer, golfer, and fisherman; and he also goes in for spectator sports and attends biweekly symphony concerts in New York in season.

At home, Bryan is "the complete handyman" and likes the role. "I never call a repairman," he boasts. "Remember, I was a carpenter when I first went to work for Esso."

The Bryans, who make their home in Manhattan, have two grown sons.

▶▶▶ Personals

Lord Robbins, chairman of the Financial Times of London, has been appointed a director of British Petroleum Co., effective January 1. He succeeds the late Lord Weeks.

Harry J. Kennedy, senior vice president of Continental Oil Co. in Houston, will retire December 31 after 41 years with the company. Kennedy was named Conoco general sales manager in 1930 and elected marketing vice president in 1936. He has been a senior vice president since 1958.

Donald R. Bergmann, formerly consulting geologist, has joined Dakota International Petroleum, Inc., Bismarck, N. D., as executive vice president in charge of exploration. Bergmann was district geologist in Bismarck for The California Co. before becoming a consultant earlier this year.

K. B. Green, senior production engineer for Mobil Oil Co. in Santa Fe Springs, Calif., has been promoted to district engineer in Taft, Calif.

Edwin R. Smith will join Humble Oil & Refining Co.'s headquarters staff in Houston January 1 as assistant to **D. W. Ramsey, Jr.,** vice president and director for marketing. Smith had been executive vice president of Humble's Oklahoma - Pate division since 1956.

▶▶▶ Personals

CONN

M. W. Conn has been promoted to manager of the sales and development division in Phillips Petroleum Co.'s international department. He will headquarter in New York. Conn succeeds **John Getgood,** who recently resigned to become president of Pacific Petroleums, Ltd. **I. L. Coffman,** project analyst in the international department, New York, will succeed Conn as assistant manager of the sales and development division.

R. E. George, Phillips Petroleum Co. area reservoir engineer in Odessa, Tex., has joined the National Bank of Detroit as petroleum engineer.

P. V. Harper, formerly research chemist with Shell Chemical Co., has joined Jefferson Chemical Co.'s Austin, Tex., laboratories as technical-service representative in the field-services section.

James W. Jennings, research engineer for Gulf Research & Development Co. in Harmarville, Pa., has been transferred to Houston as senior production engineer for Gulf Oil Corp.

C. R. Heaney, Jr., Warren Petroleum Corp.'s marine department manager, has been promoted to assistant general manager of the terminal and transportation division. **R. A. Land,** Heaney's assistant, will succeed him as manager of the marine department.

J. W. W. Whitney, Jr., general production superintendent for Helmerich & Payne, Inc., has resigned to form Whitney Operating Co. in Tulsa. The company will specialize in operating and managing producing properties. Whitney had been with Helmerich & Payne since 1955.

Henry H. R. Sharkey, Humble Oil & Refining Co., has been elected 1961 president of Rocky Mountain Association of Geologists. Other new officers are **Earl G. Griffith,** independent, first vice president; **Robert J. Knox,** Knox, Bergman & Shearer, second vice president; **Arthur F. Brunton,** Clayton Oil Co., treasurer; **John D. Haun,** Colorado School of Mines, secretary; and **Paul S. Pustmueller,** Fremont Petroleum Co., councilor.

Ray Flurry, subsurface geologist for Mobil Oil de Venezuela, has been transferred to Anaco from Caracas.

Leroy J. Langan, petroleum engineer with Amerada Petroleum Corp., has been transferred to Tulsa from Williston, N. D.

Ernest H. Pronske, Shell Oil Co. exploitation engineer, has been transferred to Ventura, Calif., from Long Beach, Calif.

Alan K. Roebuck has been named senior research scientist at the Whiting, Ind., research laboratories of Standard Oil Co. (Ind.). **James L. Wilson** has been named project chemical engineer there.

Clay Harrell, geologist with Harrell Oil Corp. & Harrell Drilling Co., has been transferred to Corpus Christi, Tex., from McAllen, Tex.

Eugene P. Langston, engineer with Humble Oil & Refining Co. in Magnolia, Ark., has been transferred to Shreveport, La., in the same capacity.

Maynard P. Venema, president of Universal Oil Products Co., has been named chairman and chief executive officer, succeeding **David W. Harris.** Venema will continue as president. Harris will continue as a director and chairman of the finance committee.

Roy N. Giles, assistant manager of the Mandan, N. D., refinery of Standard Oil Co. (Ind.), has been named to succeed **T. E. Stockdale** as manager. Stockdale, manager since 1954, will retire March 13.

Ira H. Cram has been appointed assistant to the president of Continental Oil Co. with headquarters in New York. Cram relinquishes the title of senior vice president but will continue to be chairman of the executive committee and to be responsible for world-wide production and exploration policy. **A. W. Tarkington,** senior vice president in Houston, has been transferred to New York, where he will direct foreign, corporate, and financial activities. **John G. McLean,** financial and transportation vice president in Houston, has been named financial vice president. McLean also will take over direction of the coordinating and planning department. This department was formerly under **L. C. Peters,** vice president, coordination and supply. Peters will take over transportation duties formerly handled by McLean. Peters' new title will be vice president, transportation and supply.

Ray A. Burke, manager of Union Oil Co.'s West Texas division, has been named director of exploration.

BURKE

Arch Dawson, manager of the Oklahoma division, has been named director of production. The Oklahoma division and the West Texas and Rocky Mountain divisions have been consolidated to form a new central division with headquarters in Midland, Tex. **C. F. Bowden,** former chief petroleum engineer now assistant to **Basil Kantzer,** vice president, has been named manager of the new central division. **W. Layton Stanton,** manager of the Rocky Mountain division, has been transferred to Union's home office in Los Angeles.

DAWSON

BOWDEN

John E. Taylor, superintendent of Arkansas Louisiana Gas Co.'s gas-pipeline division, has been elected vice president of Arkansas Industrial Pipeline Corp., a subsidiary. He has been a director of the company since 1958. **Dave E. Sullenberger,** superintendent of operations and a director of Arkansas Louisiana Chemical Corp., also an Arkla subsidiary, has been elected vice president of the chemical company. **Robert E. Wellborn,** general manager of Reynolds Gas Regulator Co.'s Anderson, Ind., plant, has been elected a director. Reynolds is also an Arkla subsidiary.

George A. Seymour, chief pipeline engineer of Mobil International Oil Co.'s producing department, has been transferred to Mobil Oil Co. de Venezuela.

Jack Coughlin has succeeded his father, the late Richard J. Coughlin, Sr., as president of Westland Oil Co., Minot, N. D. **Richard J. Coughlin, Jr.,** has been named vice president. **Mrs. Richard J. Coughlin, Sr.,** has been elected a director.

▶▶▶ Personals

Harry K. Sutherland, chief technologist at Shell Oil Co.'s Wood River, Ill., refinery, has been named superintendent of the Wilmington - Dominguez refinery, Los Angeles. He succeeds **J. B. St. Clair,** who has been named superintendent of the Houston refinery. Sutherland has been with Shell since 1938. He was assistant manager of the technological department before moving to Wood River. St. Clair had been assistant manager of the manufacturing-technological department in New York and process superintendent at the Martinez, Calif., refinery before being named superintendent of the Wilmington-Dominguez refinery 2 years ago.

SUTHERLAND

Fred M. Nelson, chairman and chief executive of Texas Gulf Sulphur Co., has retired. **Claude O. Stephens,** president, will succeed Nelson as chief executive officer. No new chairman has been named.

J. N. Chatfield, technical superintendent for Standard-Vacuum Oil Co. in Palembang, Sumatra, has joined Humble Oil & Refining Co. as staff engineer in the technical division, Baytown, Tex. He was process foreman at Humble's Baytown refinery before joining Stanvac in 1953.

Hulusi Berilgen has been appointed chief petroleum engineer for Mobil Exploration Mediterranean, Socony Mobil Oil Co. affiliate responsible for exploration in Turkey. Berilgen has worked for 11 years in the Raman-Garzan fields and other parts of Turkey. A graduate of the University of California, he joined Mobil in 1956.

Les Neblett, Standard Oil Co. of California, has been elected chairman of the Coalinga-Kettleman chapter of API's Division of Production. Other new officers are **E. Lester,** California Standard, first vice chairman; **Reg Hessellund,** Pacific Gas & Electric Co., second vice chairman; and **Bob Collins,** Texaco Inc., secretary-treasurer.

Craig A. Lyon, geophysicist for Standard Oil Co. of California, has been transferred to Seattle from Oildale, Calif.

John J. Healy, Monsanto Chemical Co., St. Louis, has been elected 1961 president of American Institute of Chemical Engineers.

Theodore S. Petersen, president of Standard Oil Co. of California, has been elected a director of Middle South Utilities, Inc.

Jerry D. Hawsey, petrochemical sales trainee for Continental Oil Co. in Pampa, Tex., has been promoted to petrochemical sales engineer and transferred to Midland, Tex.

Ahmad Ebrahimi, process engineer with Sunray Mid-Continent Oil Co., has been promoted to senior process engineer, Tulsa.

John E. Overbeck, vice president of engineering and research for Columbia Gas System Service Corp., has retired after 44 years with the Columbia System.

P. L. Richards, manager of the sales division of Esso Export Corp.'s chemicals department, has been named assistant general manager of the cargo-sales department. **E. F. H. Pennekamp,** director of Enjay laboratories for Esso Research & Engineering Co., has succeeded Richards with Esso Export.

Dr. J. B. Lavigne has been promoted to senior research chemist in the chemicals process - development section of California Research Corp.'s Richmond, Calif., laboratory. **O. A. Fredriksson,** group supervisor at the La Habra, Calif., laboratory, has been promoted to supervising research engineer in geophysics development, La Habra.

L. L. Sloss, Northwestern University, has been elected president of Society of Economic Paleontologists and Mineralogists. He will succeed **W. M. Furnish,** Iowa State University, in April. Other new officers are **Kenneth E. Lohman,** U. S. Geological Survey, vice president; **Lloyd C. Pray,** Ohio Oil Co., secretary-treasurer; **L. D. Toulmin,** Florida State University, and **Albert L. Kidwell,** Jersey Production Research Co., councilors. Editors are **M. L. Thompson** and **Charles W. Collinson** of Illinois Geological Survey, and **Lewis M. Cline,** University of Wisconsin.

Sidney A. Shuman, assistant to the president of National Supply Co., has been named to succeed **Arthur W. McKinney** as head of the company. McKinney has retired after 40 years with National Supply and 6 years as its president. National Supply is being reorganized and after December 31 will operate as a division of Armco

SHUMAN

McKINNEY

Steel Corp., the parent company. Merger of Armco and National Supply took place in 1958. Shuman will be an Armco vice president and general manager of the National Supply division. Shuman was executive vice president of Fluid Packed Pump Co. until it was purchased by National Supply last year. He served as general manager of the Fluid Packed Pump division before being named assistant to the president earlier this year. McKinney had been National Supply general manager of sales, vice president, and executive vice president before being named president in 1954. He is a founder and past president of Petroleum Equipment Suppliers Association.

Bruno Castiglioni, process engineer for Arthur G. McKee in Cleveland, has joined Lummus Co. as process engineer in Houston.

Edward W. Nicholson, assistant manager of Esso Research & Engineering Co.'s refinery-liaison unit, has been named an assistant director of the products-research division.

Gene L. Shaw has been named Rocky Mountain regional geologist for Lion Oil Co. division of Monsanto Chemical Co. He succeeds **T. W. Lins,** who has joined Lion's recently-announced technical advancement program (OGJ, Nov. 14, p. 108). Shaw will headquarter in Denver.

Tom V. McGannon, supervisor of the coordination and economics department at American Oil Co.'s Texas City refinery, has been transferred to Chicago as assistant manager of light-oil supply planning. **Calvin E. Sparks,** division supervisor of the Texas City coordination and economics department, will succeed McGannon as department supervisor. **Earnest J. Brinkman** will succeed Sparks.

Personals

Donald Danz, geophysical supervisor for Pan American Venezuelan Oil Co., has been transferred to Libya.

Richard D. Norton will retire January 1 as senior geologist with Texaco Inc. in New Orleans.

Freeman W. Burford has resigned as president of Sid Richardson Refining Co., Dallas and Texas City. He will step down January 1 after sale of the company to Texas City Refining, Inc., becomes effective. Burford had been president and chief executive officer since the company was organized in 1946.

Clifford V. Shireman, superintendent of planning in California Oil Co.'s refining division, has been named manager of economic analysis, a new position. He will be succeeded as planning superintendent by **James J. Motroni,** senior analyst in the economic-analysis group. Shireman was an engineer at Standard Oil Co. of California's El Segundo, Calif., refinery before joining Caloil in 1949. Motroni joined Caloil in 1950 as engineer in the process-development section.

SHIREMAN

MOTRONI

Edward P. Keeler, production engineer in Mobil Oil Co.'s Lafayette, La., producing district, has been promoted to staff proration engineer for the Houston exploration and producing division.

John P. McNaughton, formerly executive vice president of Neville G. Penrose, Inc., has been elected vice president of Broseco Corp. and named manager of the company's new Fort Worth office. **J. R. French** has been named geologist-geophysicist in the Fort Worth office. He also had been with Penrose.

Dr. Howard N. Moulden has joined California Research Corp. as research chemist at the Richmond, Calif., laboratory. New research engineers at Richmond are **John M. Harper, Robert W. Forstrom, Donald L. Corey,** and **Louis B. Nobbe. Dr. Robert G. Dean** has joined Cal Research as research engineer at the La Habra, Calif., laboratory.

Howard G. Vesper, president of Standard Oil Co. of California, Western Operations, Inc., has been reelected president of Western Oil and Gas Association. Other officers elected include **George F. Getty II,** president of Tidewater Oil Co., first vice president; **R. R. Von Hagen,** president of Lloyd Corp., Ltd., second vice president; and **Stuart H. Durkee,** vice president and treasurer of Superior Oil Co., treasurer. **Felix Chappellet** was reelected secretary, vice president, and general manager of the association.

L. C. Adams, Rocky Mountain division exploration superintendent for Pan American Petroleum Corp., has been named manager of exploration. He will move to Pan Am's Tulsa headquarters from Casper, Wyo. Adams succeeds **J. C. Johnston,** who last week was appointed vice president and division manager in Houston. Adams has been with Pan Am since 1948. He was Lake Charles, La., district exploration superintendent before moving to Casper in 1958.

ADAMS

Ralph Walsh, president of Armstrong Engineering Co., has been elected president and a director of Macmillan Petroleum Corp., Los Angeles. He succeeds **S. M. Batterson,** who has retired. Walsh is a former vice president of Richfield Oil Co. of California.

J. W. Billard has been named assistant manager, operations, for Texas Petroleum Co.'s Venezuelan division. He will be replaced as chief petroleum engineer by **William A. Gatenby,** formerly in Mata oil field. **J. E. F. Caston,** chief geologist for the Venezuelan division, has been named assistant to the manager of operations. **Hans Tanner,** formerly in Texpet's Colombian division, will succeed Caston.

Deaths

Waller Chenault, Sr., 74, Louisville, Ky., independent operator, died December 13 in an auto accident near Greensburg, Ky. Chenault entered the oil business in 1918 during the Lee County, Kentucky, oil boom.

Charles Mercer Potter, 65, retired drilling supervisor for Standard Oil Co. of California, died December 15 at his home in Bakersfield, Calif. Potter was with California Standard for 36 years before retirement. He had served on foreign assignments in Venezuela, Colombia, and Saudi Arabia.

Clarence E. (Husky) Reynolds, 79, retired drilling contractor, died December 16 in a Los Angeles rest home after a long illness. Reynolds entered the oil business in 1900 in the Bartlesville, Okla., area. He was involved in many of the big booms of the 1920's and at one time had rigs operating in six Mid-Continent and southwestern states.

George McCray, 59, retired division drilling supervisor for Pan American Petroleum Corp., died December 17 at his home in Houston.

Raymond W. Ketelsen, 67, Houston independent, died December 7 in Cisco, Tex. He was there on a business trip. Ketelsen had been an independent since 1945.

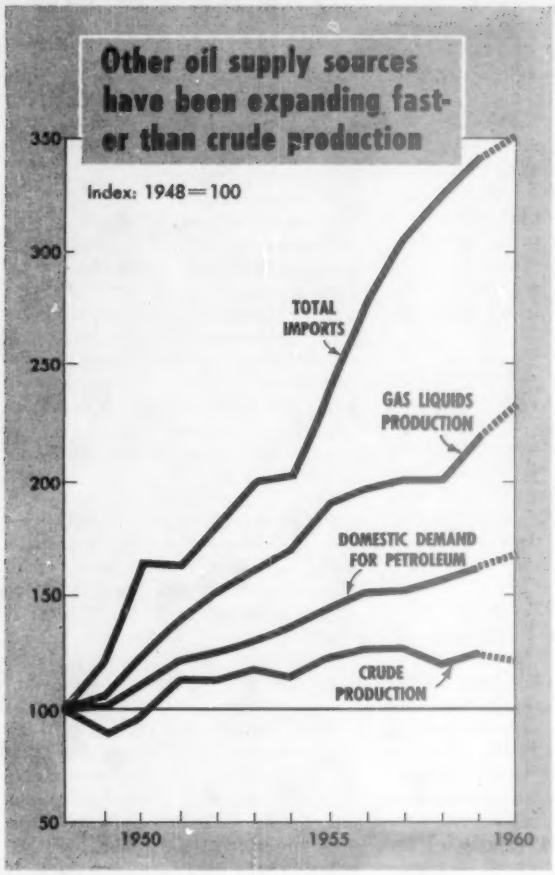
R. F. Doepel, 64, former president and owner of Braun Brothers Oil Co., died December 14 at his home in Winnetka, Ill.

Ralph Wallace Garrett, 69, retired general counsel for Sinclair Oil & Gas Co. and Sinclair Crude Oil Co., died December 21 in a Tulsa hospital. Garrett retired in1957 after 40 years with the Sinclair companies.

Marion T. Meadows, 69, Fairchild Aerial Surveys' representative in Buenos Aires for 15 years, died recently in Buenos Aires. He was formerly president of Geotechnica there.

Charles Bryant Garretson, 65, president of Coast Petroleum Co., died December 19 at his home in Los Angeles. During World War II Garretson served as District 5 director of marketing for the Petroleum Administration for War.

Plummer T. Dunkle, 54, superintendent of Buckeye Pipe Line Co.'s Cleveland division, died December 17 at his home in Lima, Ohio. He had been with Buckeye 30 years.



Rapid gains by imports and gas liquids limit crude production

BY JOHN C. CASPER

CRUDE has been the oil industry's slow-growing supply item in the period since the end of World War II. Production for 1960 will average only 7,020,000 bbl. daily, a decrease for the year of 34,000 bbl. daily. Also, the 1960 total will be down 150,000 bbl. daily or 2.5% from the all-time record set in 1957.

Production has topped 7,100,000 bbl. daily only twice, once in 1956 and again in 1957. These records can't be credited to gains in domestic demand, nor were they due to legal limitations on imports. The rise was in the last quarter of 1956 and the first half of 1957. It resulted from increased exports during the Suez crisis.

Take a look at the four lines on the chart to the left. Crude production is at the bottom. Points for the lines represent index numbers based on 1948 equal to 100. If you want to read the lines as per cent gain since 1948, subtract 100 from the scale at the left.

Crude production averaged 7,054,000 bbl. daily in 1959 compared with 5,520,000 bbl. daily in the base year 1948. The index number for 1959 was 127.8 or a gain of 27.8% over 1948. The number for 1960 is down slightly to 127.2.

Production Lags Domestic Demand

Note that the crude-production line has been below the demand line for the entire period. Production just has not grown as fast as domestic demand for petroleum. Demand this year will be up 68% over 1948 compared with 27.8% for crude.

The third line from the bottom of the chart pictures the relative growth by natural-gas liquids. Production at natural-gasoline and cycling plants averaged 402,000 bbl. daily in the base year 1948. This year's production will average about 933,000 bbl. daily to give an index point of 232 or a net gain of 132% over 1948.

The big increase has been in imports. The percentage gain in imports since 1948 is nine times the gain in crude production. Imports averaged 514,000 bbl. daily in 1948 and climbed to 1,810,000 bbl. daily for 1960. The ratio gives an index number of 352 or a net gain of 252%. Crude production gained only 27.8%.

Here is another interesting comparison. For the period from 1951 through 1960, the actual volumetric gain in imports exceeded the increase in crude production. In the 9-year period crude production increased 862,000 bbl. daily. Total imports increased 966,000 bbl. daily.

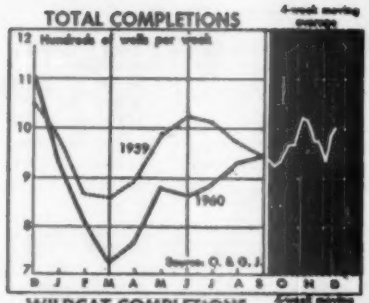
Restrictions on imports have slowed down the gains but have not completely halted them. Note the curve is still rising. But, if imports had continued to gain at the 1955-56 rates, the average for 1960 would have been up to 2,200,000 bbl. daily.

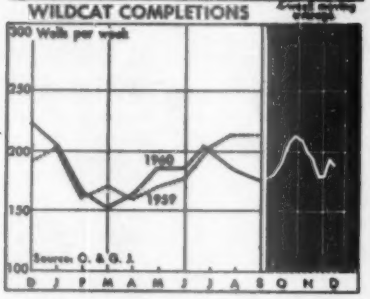
For the 1948-60 period, the combined gains by imports and gas liquids exceed crude-production increases by 328,000 bbl. daily.

A quick look at the highlights . . .

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	7,124,400	DOWN	12,900	DOWN	106,816
Crude stocks	239,269,000	UP	978,000	DOWN	14,374,000
Completions	981	DOWN	176	DOWN	200
Refinery runs	7,927,000	UP	40,000	DOWN	144,000
Gasoline stocks	189,959,000	UP	2,823,000	UP	7,121,000
Kerosine stocks	34,603,000	DOWN	750,000	UP	7,408,000
Distillate stocks	159,534,000	DOWN	7,104,000	UP	3,339,000
Residual stocks	48,632,000	DOWN	188,000	DOWN	3,844,000
Four-product stocks	432,728,000	DOWN	5,219,000	UP	14,024,000
Total imports	1,479,100	DOWN	463,100	DOWN	296,600

Active Rotary Rigs





	12-19-60	12-12-60	12-21-59
Alabama	6	6	5
Alaska	7	4	(†)
Alabama	9	9	13
Arizona	1	1	0
California	82	83	89
Land	79	81	83
Offshore	3	2	6
Colorado	26	31	43
Florida	4	4	1
Land	2	2	1
Offshore	2	2	0
Georgia	2	2	0
Illinois	43	40	41
Indiana	13	13	7
Kansas	130	127	160
Kentucky	5	3	10
Louisiana	272	274	307
North	31	35	42
S. Inland waters	97	94	110
S. Land	96	96	101
Offshore	48	49	54
Michigan	31	34	42
Mississippi	60	53	79
Missouri	2	2	0
Montana	32	31	23
Nebraska	22	21	27
Nevada	1	1	0
New Mexico	98	112	115
New York	2	2	0
North Dakota	17	15	31
Ohio	5	6	3
Oklahoma	201	207	238
Oregon	1	0	0
Pennsylvania	13	12	13
South Dakota	0	0	4
Tennessee	1	1	0
Texas	630	657	760
S. Inland waters	9	7	8
S. Land	176	192	214
Offshore	2	2	0
North	63	66	193
Panhandle	54	56	(*)
East	48	52	(*)
West Central	‡151	‡160	229
West	127	122	116
Utah	31	32	30
Washington	1	1	1
West Virginia	6	6	3
Wisconsin	1	1	0
Wyoming	73	72	72
Total U. S.	1,828	1,863	2,117
Western Canada	182	163	218
Eastern Canada	0	0	1
Grand total	2,010	2,026	2,336

Hughes Tool Co. report. *Included in North. Comparisons not available due to change in method of reporting. †Data first reported 4-4-60. ‡Stephens and Eastland counties now included in West Central Texas.

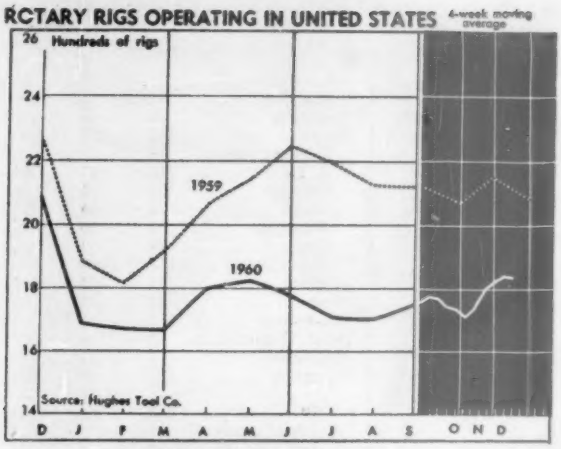
WEEKLY WELL COMPLETIONS . . . WEEK ENDED DECEMBER 17, 1960

	Total wells							Cum.		Total wildcats					Cum.	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1960	1959	Total	Crude	Cond.	Gas	Dry	1960	1959
Arkansas	10	4	0	1	5	0	34,814	596	829	0	0	0	0	0	144	145
California	46	35	0	2	9	0	205,663	1,679	1,493	8	0	0	1	7	297	394
Colorado	25	4	1	2	18	0	149,432	662	762	15	1	1	1	12	330	431
Illinois	52	20	0	0	15	17	116,764	2,277	2,287	7	0	0	0	7	478	383
Indiana	19	8	0	0	10	1	24,957	1,022	846	2	0	0	0	2	356	288
Kansas	50	25	0	3	17	5	146,602	4,011	3,861	8	0	0	0	8	1,014	1,038
Kentucky	32	11	0	1	20	0	39,739	2,084	3,192	3	1	0	0	2	217	365
Louisiana	106	49	5	18	33	1	742,314	3,588	3,690	10	2	1	0	7	538	493
North	47	18	0	15	14	0	145,654	1,421	1,477	5	1	0	0	4	262	228
South	50	24	5	3	17	1	502,369	1,688	1,809	5	1	1	0	3	242	250
Offshore	9	7	0	0	2	0	94,291	479	404	0	0	0	0	0	34	15
Michigan	17	5	0	0	12	0	63,623	908	637	6	0	0	0	6	251	180
Mississippi	19	3	0	0	16	0	134,036	663	626	7	0	0	0	7	259	273
Montana	10	6	0	0	4	0	52,660	333	331	3	0	0	0	3	158	116
Nebraska	24	12	0	0	12	0	113,726	848	880	4	0	0	0	4	367	393
New Mexico	39	22	0	10	7	0	221,785	1,800	2,049	4	2	0	0	2	248	253
West	14	4	0	10	0	0	86,755	657	897	0	0	0	0	0	69	64
East	25	18	0	0	7	0	135,030	1,143	1,152	4	2	0	0	2	179	189
New York	0	0	0	0	0	0	0	302	279	0	0	0	0	0	43	22
North Dakota	2	1	0	0	1	0	8,414	275	421	0	0	0	0	0	80	78
Ohio	41	14	0	17	8	2	119,283	1,058	1,063	3	0	0	1	2	52	32
Oklahoma	105	51	1	7	27	19	306,852	4,592	5,262	10	0	0	2	8	685	811
Pennsylvania	0	0	0	0	0	0	0	834	581	0	0	0	0	0	16	21
Texas	318	158	13	9	129	9	1,281,778	15,045	18,065	61	1	3	0	57	3,080	3,436
Dist. 1	23	13	0	0	9	1	79,242	1,078	1,048	5	0	0	0	5	378	318
Dist. 2	13	2	1	1	9	0	91,386	734	781	1	0	0	0	1	180	227
Dist. 3	29	9	4	0	16	0	190,261	1,135	1,144	6	0	1	0	5	218	226
Dist. 4	26	10	3	0	13	0	155,204	1,032	1,308	8	0	1	0	7	286	340
East	20	12	3	0	5	0	84,897	1,258	1,209	2	0	0	0	2	258	243
Dist. 7-B	52	18	1	2	27	4	157,414	2,151	2,546	12	1	1	0	10	612	675
West	79	50	0	0	28	1	349,364	3,849	5,381	20	0	0	0	20	618	736
Dist. 9	65	40	0	2	20	3	125,642	2,814	3,414	7	0	0	0	7	475	564
Dist. 10	11	4	1	4	2	0	48,368	994	1,234	0	0	0	0	0	55	107
Utah	5	2	0	0	3	0	28,319	235	296	3	0	0	0	3	92	88
West Virginia	26	1	0	24	1	0	68,365	836	770	1	0	0	0	1	10	28
Wyoming	29	11	0	2	16	0	157,326	1,036	955	11	0	0	0	11	416	358
Miscellaneous*	6	1	0	0	5	0	39,731	268	236	5	0	0	0	5	185	115
Total U. S.	981	443	20	96	368	54	4,056,183	44,952	49,411	171	7	5	5	154	9,316	9,741
Previous week	1,157	487	28	113	428	101	4,503,878	.....	.....	240	16	6	12	206	.....	.....
Cum. 1960	44,952	20,314	1,277	3,837	16,930	2,594	184,383,627	.....	.....	9,316	832	110	319	8,055	.....	.....
Cum. 1959	49,411	24,696	1,210	3,641	18,492	1,372	202,918,697	.....	.....	9,741	861	108	323	8,449	.....	.....
Western Canada	35	26	0	0	9	0	389,942	2,220	2,357	6	1	0	0	5	571	656

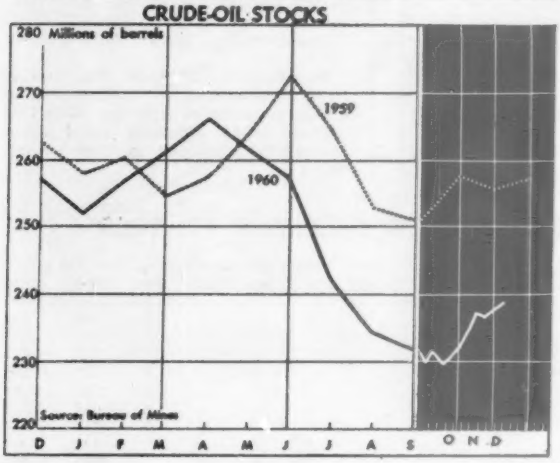
*Alaska, Florida, South Dakota, Arizona.

PRODUCTION

ROTARY RIGS OPERATING IN UNITED STATES



CRUDE-OIL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*
(Thousands of barrels)

	12-10-60	12-3-60	12-12-59
Pennsylvania	2,308	2,330	2,384
Other Appalachian	1,331	1,343	2,077
Illinois, Indiana, Michigan	8,631	9,280	10,258
Nebraska and North Dakota	2,704	2,952	3,294
Kansas	8,959	8,861	9,381
Oklahoma	14,933	14,900	15,947
Arkansas	1,825	1,936	2,231
Louisiana	19,701	18,769	17,933
North	3,125	3,109	3,605
South	16,576	15,660	14,328
Mississippi, Alabama, Florida	1,916	2,196	2,240
New Mexico	8,434	8,553	8,397
Texas	100,478	99,570	111,310
East Texas	7,595	7,317	7,954
West Texas	47,147	46,736	52,813
Texas Gulf	17,862	17,834	20,812
Other Texas	27,874	27,683	29,731
Wyoming	16,789	16,354	16,916
Other Rocky Mountain	10,240	10,355	9,697
California	26,428	26,309	28,726
Foreign	†14,592	14,583	12,852
Total	**239,269**	238,291	253,643

*Bureau of Mines. †Includes 5,155,000 bbl. in California.

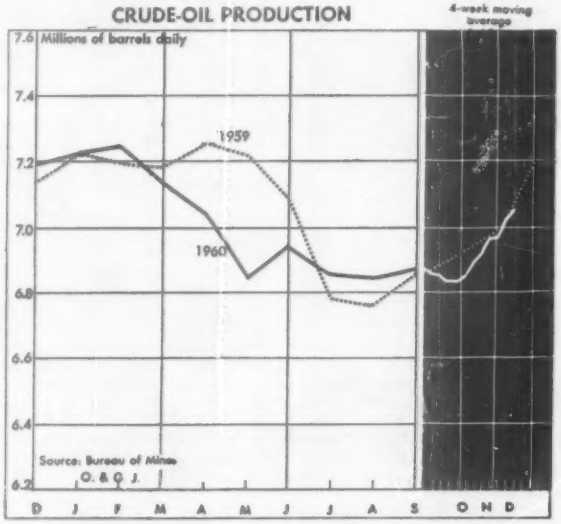
DAILY AVERAGE PRODUCTION FOR WEEK

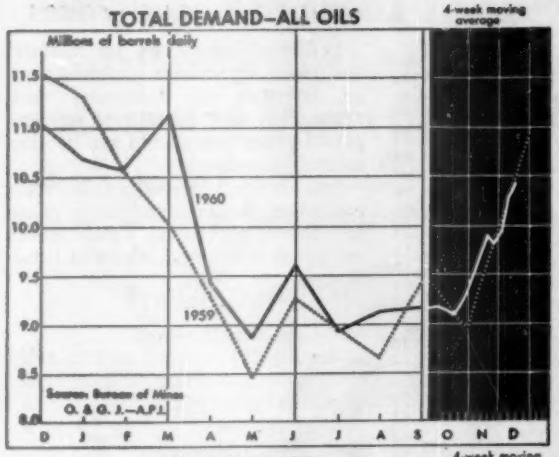
	December 17, 1960			Dec. 10
	Crude oil	Lease condensate	Total	total
Alabama	21,700	.....	21,700	21,550
Alaska	5,000	.....	5,000	5,000
Arkansas	74,425	150	74,575	74,500
California	834,300	.....	834,300	834,000
Colorado	132,500	.....	132,500	132,100
Eastern	40,200	.....	40,200	39,600
Florida	875	.....	875	875
Illinois	222,400	.....	222,400	220,700
Indiana	32,800	.....	32,800	33,100
Kansas	†297,575	.....	†297,575	†304,750
Kentucky	58,700	.....	58,700	59,100
Louisiana	968,300	135,300	1,103,600	1,103,450
North	105,300	5,300	110,600	110,450
South	863,000	130,000	993,000	993,000
Michigan	48,300	.....	48,300	48,500
Mississippi	146,775	4,100	150,875	150,875
Montana	81,000	.....	81,000	82,100
Nebraska	63,800	.....	63,800	65,300
Nevada	50	.....	50	50
New Mexico	292,000	8,500	300,500	300,500
North Dakota	66,100	.....	66,100	65,600
Oklahoma	†509,200	.....	†509,200	†522,900
Texas	2,500,000	90,000	2,590,000	2,590,000
Dist. 1	44,000	3,200	47,200	47,200
Dist. 2	108,000	8,300	116,300	116,300
Dist. 3	320,000	38,350	358,350	358,350
Dist. 4	179,000	12,200	191,200	191,200
Dist. 5	27,000	500	27,500	27,500
Dist. 6	109,000	9,800	118,800	118,800
East Texas field	133,000	.....	133,000	133,000
Dist. 7-B	123,000	400	123,400	123,400
Dist. 7-C	117,000	3,150	120,150	120,150
Dist. 8.	1,041,000	10,400	1,051,400	1,051,400
Dist. 9	199,000	2,000	201,000	201,000
Dist. 10	100,000	1,700	101,700	101,700
Utah	112,800	.....	112,800	116,100
Wyoming	376,800	.....	376,800	370,200
Others	‡750	.....	‡750	‡750
Total U. S.	6,886,350	238,050	**7,124,400**	7,141,600
Change from previous week, down			**17,200**	
Canada	†566,700	.....	†566,700	†489,000

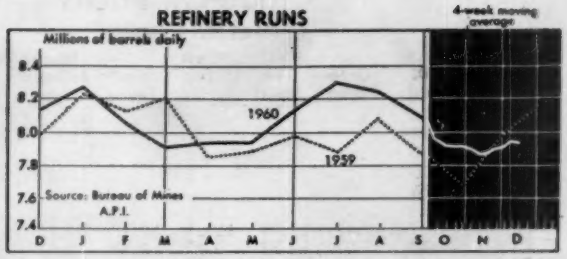
Total U. S. prod., Jan. 1—Dec. 17 ..... 2,471,512,600 bbl.
Same period last year (crude plus cond.) ..... *2,473,900,500 bbl.

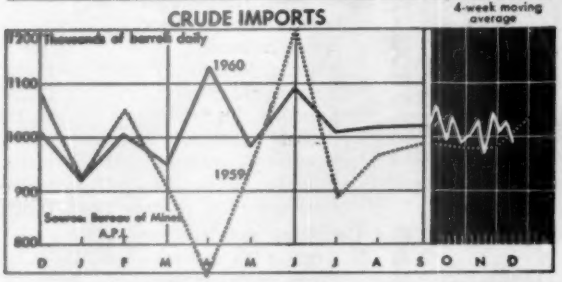
*Includes 66,701,300 bbl. condensate. †Week ended previous Monday. ‡South Dakota and Arizona.

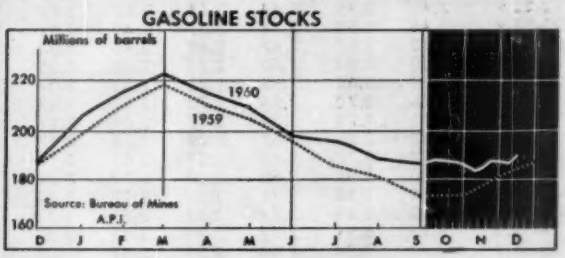
CRUDE-OIL PRODUCTION

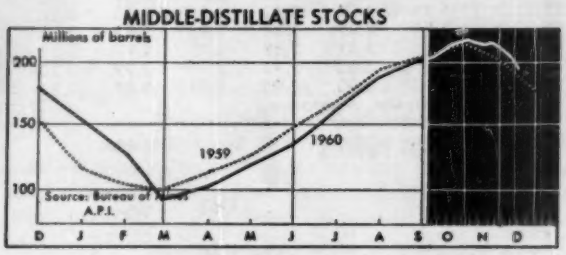


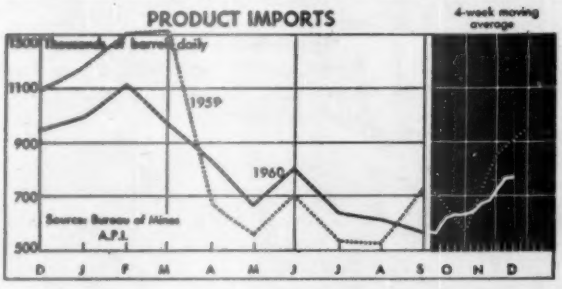


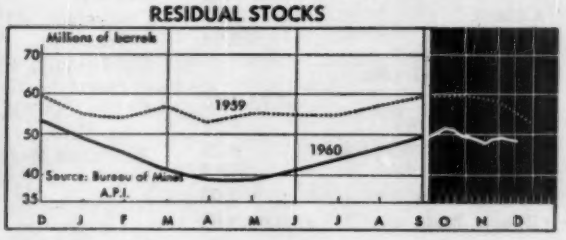












API REFINERY REPORT—DECEMBER 16, 1960

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, December 1959 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,092	490.3	21.4	341.6	146.1	44,896	14,369	63,829	15,098	1,119	524.9	39.8	359.0	149.4
Appalachian:														
District 1	107	48.1	4.1	26.1	15.1	5,876	726	4,154	524	104	42.9	3.7	23.1	14.8
District 2	100	45.0	7.7	17.1	14.9	2,921	499	1,716	329	110	55.3	7.7	19.5	20.2
Ind., Ill., Ky.	1,440	761.5	80.6	309.4	190.5	30,492	7,184	27.867	6,594	1,548	798.6	82.6	359.4	231.7
Minn., Wis., Dak.	125	62.0	7.7	23.4	18.1	6,801	1,378	7,999	583	121	58.9	5.6	30.7	18.1
Okla., Kans., Mo.	717	401.3	16.3	192.8	24.1	16,634	1,243	13,078	918	699	381.5	15.5	199.5	26.1
Inland Texas	281	209.4	10.9	41.7	18.0	6,613	607	1,595	2,552	291	211.3	9.5	48.5	22.0
Texas Gulf Coast	1,835	974.7	147.4	468.2	156.1	26,284	3,310	14,912	5,293	1,877	980.1	117.9	460.1	154.5
La. Gulf Coast	653	354.6	68.4	148.1	37.0	10,737	2,347	5,454	1,306	714	363.0	87.0	163.5	47.5
N. La. and Ark.	108	65.1	6.3	20.9	6.0	5,151	1,001	3,020	140	101	46.7	6.7	23.5	8.1
Rocky Mountain:														
New Mexico	21	11.1	0.3	3.6	2.6	828	36	135	17	23	14.2	0.6	4.1	2.3
Other	273	134.3	4.9	65.1	30.1	5,590	338	2,737	1,161	293	141.9	3.9	69.6	34.4
West Coast	1,175	528.4	46.3	188.3	290.5	27,136	1,565	13,038	14,117	1,143	534.7	4.8	178.5	277.5
Dec. 16, 1960	7,927	4,085.8	422.3	1,846.3	949.1	189,959	34,603	159,534	48,632	8,143	4,154.0	385.3	1,939.0	1,006.6
Dec. 9, 1960	7,887	4,110.1	418.3	1,837.0	951.1	187,136	35,353	167,038	48,820	.....	.....	.....	.....	.....
Dec. 18, 1959	8,071	4,189.9	381.0	1,859.7	989.9	182,838	27,195	156,195	52,476	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Crude-Oil Prices

GRAVITY SCHEDULE

	Signal Hill, Calif.	Oklahoma	West Tex. (sour)	West Tex. (Inter.)	No.* Texas	Texas Refugio Light	Bayou Sale (La.)	Denver Julesburg	Wyo. (sour)
14-14.9	$1.86	....	....	....	....	....	....	....	....
15-15.9	1.93	....	....	....	....	....	....	....	$1.81
16-16.9	2.00	....	....	....	....	....	....	....	1.86
17-17.9	2.06	....	....	....	....	....	....	....	1.91
18-18.9	2.13	....	....	....	....	....	....	....	1.96
19-19.9	2.20	....	....	....	....	....	....	....	2.01
20-20.9	2.27	$2.49	$2.35	$2.61	$2.29	$2.95	$2.90	$2.58	2.06
21-21.9	2.33	2.52	2.38	2.63	2.33	2.97	2.92	2.60	2.11
22-22.9	2.40	2.55	2.41	2.65	2.37	2.99	2.94	2.62	2.16
23-23.9	2.46	2.58	2.44	2.67	2.41	3.01	2.96	2.64	2.21
24-24.9	2.53	2.61	2.47	2.69	2.45	3.03	2.98	2.66	2.26
25-25.9	2.60	2.64	2.50	2.71	2.49	3.05	3.00	2.68	2.31
26-26.9	2.67	2.67	2.53	2.73	2.53	3.07	3.02	2.70	2.36
27-27.9	2.74	2.70	2.56	2.75	2.57	3.09	3.04	2.72	2.49
28-28.9	2.81	2.73	2.59	2.77	2.61	3.11	3.06	2.74	2.54
29-29.9	2.87	2.76	2.62	2.79	2.65	3.13	3.08	2.76	2.59
30-30.9	2.93	2.79	2.65	2.81	2.69	3.15	3.10	2.78	2.63
31-31.9	3.00	2.82	2.68	2.83	2.73	3.17	3.12	2.80	2.67
32-32.9	3.06	2.85	2.71	2.85	2.77	3.19	3.14	2.82	2.71
33-33.9	3.12	2.88	2.74	2.87	2.81	3.21	3.16	2.84	2.75
34-34.9	3.17	2.91	2.77	2.89	2.85	3.23	3.18	2.86	2.79
35-35.9	3.22	2.94	2.80	2.91	2.89	3.25	3.20	2.88	2.83
36-36.9	3.27	2.97	2.83	2.93	2.93	3.27	3.22	2.90	2.87
37-37.9	3.31	2.99	2.86	2.95	2.95	3.29	3.24	2.92	2.89
38-38.9	....	3.01	2.89	2.97	2.97	3.31	3.26	2.94	2.91
39-39.9	....	3.03	2.92	2.99	2.99	3.33	3.28	2.96	2.93
40-44.9	....	3.05	2.95	3.01	3.01	3.35	3.30	2.98	2.95

*Cooke, Grayson, Montague.

Flat Prices

Louisiana:
- Sweet Lake $3.00

Texas:
- East Texas 3.05-3.25
- Conroe 3.23-3.53
- Van 3.08

Pennsylvania Grade:
- Bradford $4.75-4.80
- Middle District 4.52
- Southwest Pennsylvania 4.25
- West Virginia 4.17
- Buckeye Grade 4.08

Illinois Basin 3.00-3.05

Foreign

Middle East, Persian Gulf:
(cargoes f.o.b. lifting port)
- Arabian, 34.0°-34.9°, Ras Tanura $1.80
- Iranian, 34.0°-34.9°, Bandar Mashur 1.78
- Iranian, 34.0°-34.9°, Abadan 1.73
- Iraq, 35.0-35.9°, Fao 1.72
- Kuwait, 31.0°-31.9°, Mina-al-Ahmadi 1.59
- Qatar, 41.0°-41.9°, Umm Said 1.95

Middle East, E. Mediterranean:
- Arabian, 34.0°-34.9°, Sidon $2.17
- Iraq, Mosul-Kirkuk, 35.0°-35.9°, Tripoli 2.19

Far East (cargoes, f.o.b. Lutong, Sarawak):
- Seria Light, 36° 2.42

Canada:
- Leduc-Woodbend $2.53
- Redwater (Alta.) 2.42
- Weyburn (light) 2.06
- Midale C 1.69

Venezuela:
- Cumbarebo, 47°-47.9°, Tucupido 3.34
- San Joaquin, 40°-40.9°, Puerto La Cruz 3.08
- Oficina, 35°-35.9°, Puerto La Cruz 2.80
- Tia Juana medium, 26°-26.9°, Amuay* 2.30
- Quiriquire, 16.0°-16.4°, Caripito 2.10
- Lagunillas heavy, flat, Las Piedras* 2.10
- Bachaquero, flat, 15°-16°, Las Piedras* 1.88

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Tanker Rates (Long Ton)

(Latest reported spot fixtures)
- ★ Gulf-NY, dirty (ATRS—20%) $2.28
- ★ Gulf-NY, clean (ATRS+21.25%) 3.46
- ★ Carib.-NY, dirty (ATRS—7.5%) 2.54
- ★ Sidon-NY, dirty (ATRS—52.5%) 3.56
- ★ PG-UK, dirty (Scale—17.5%) (45s. 9d.) 6.41

★Denotes change from previous week.

Refined-Product Prices

Following quotations are realistic spot prices for refined products moving interstate on Wednesday each week. They may differ from refiners' posted prices and should not be considered as postings.

Light-product prices are in cents per gallon. Residual and crude prices are dollars per barrel. Crude prices are at the well unless otherwise listed.

Gasoline*

Mid-Continent (Group 3):
- Regular (91 octane).. 12.25-12.50
- Premium (99 octane) . 15.00-15.25
- Natural gasoline (26-70) 4.5
- Breckenridge 4.0

Gulf Coast (cargoes for coastwise or export movements):
- Regular (90 octane) .. 11.00
- Regular (92 octane) .. 11.25
- Premium (98 octane) . 12.25

California (rack) Los Angeles:
- Regular (88 octane) .. 11.65-12.15
- Premium (94 octane) . 12.65-13.15
- Premium (100 octane) 14.00-14.65

Caribbean area (cargoes):
- Regular (87 octane) ..10.125-10.25
- Premium (97 octane) . 11.75

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

Kerosine and Distillate

Mid-Continent (Group 3):
- ★ Kerosine 42-44 .... 10.875
- ★ Diesel oil (58 d.i. and above) 10.50
- ★ Distillate No. 1 .... 10.50
- ★ Distillate No. 2 .... 9.50

Gulf Coast (cargoes):
- ★ Kerosine 41-43 .... 9.25-9.50
- ★ Distillate No. 2 .... 8.50

New York Harbor (barges):
- Kerosine 42-43 .... 10.65
- Distillate No. 2 .... 9.65
- Diesel fuel, 48-52 d.i. 10.05

Caribbean area (cargoes):
- Distillate No. 2 .... 8.125

Residual Fuel (Bbl.)

Mid-Continent (Group 3):
- Residual fuel (max. 1% S) $1.90

Gulf Coast (cargoes):
- Bunker C fuel 2.30

New York Harbor (barges):
- Bunker C fuel 2.52

Caribbean (cargoes):
- Bunker C 2.10

California (rack):
- Bunker C fuel, Los Angeles 2.25

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Tulsa, Oklahoma

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MAKE OFFER. Reda Pump, 60 H.P., all accessories. P. O. Box 407, Riverdale, Calif. TOwnsend 7-3594.

TWO 57,000 BARREL tanks, 117' diameter 30' high with Wiggins Pan Type floating roof. Riveted shell and bottom ¼", lowest ring 3/8", 2nd ring 9/16", third ring ½", 4th ring 7/16", top ring 9/32". Tanks are located near Wink, Texas. P. L. Crandell Company, 1404 Wilco Bldg., Midland, Texas. Phone Mutual 3-3635.

GAS PROCESSING EQUIPMENT for sale, rental, lease, or participation. Turnkey installation. Refrigeration and adsorption gasoline plants, tank vapor recovery units, glycol and dessicant dehydrators, LPG fractionators and stabilizers. Also research projects contracted. Engineered Specialties Co., P. O. Box 35683, Dallas, Texas.

BETHLEHEM S 45 Breeze Drawworks 7¼ x 12 Gardner Denver pump. Air operated at driller's position. 87' Lee C. Moore Derrick. 4,850 feet of 4½" drill pipe, extra good. Rig Complete, $42,500.00. Inventory on request. Thomas Drilling Company, Inc., P. O. Box 228, Telephone 514, Holdenville, Oklahoma.

PETRO-CHEM ISO-FLOW FURNACES
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9.7 MM BTU/hr. Duty CHROME Tubes
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5 MM BTU/hr. Duty Carbon Tubes
2.5 MM BTU/hr. Duty Carbon Tubes
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Multi-Stage 8025 RPM driven by 1250 HP Synchronous Motor 3/60/2300/1200 RPM, 5 KW Direct Conn. Exciter, Falk Speed Increaser 6.70:1 Ratio, Precooler, Intercooler, Aftercooler, NEW 1954.

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PETRO CHEM FURNACES 2½ and 5 MM BTU; Clark Centrifugal Compressor 10,000 CFM, 240 PSI; Carrier 1,000 ton Refrigeration Compressor; 2 I.R. Turbo Exhausters 15,000 and 17,000 CFM, 4.85 PSI. Worthington LT6 Compressor; Pumps; Exchangers; Vessels. Brill Equipment Company, 4101 San Jacinto St., Houston 4, Texas.

FOR SALE: Clark RA-8 crankshaft in excellent condition, main journals and crankpins refinished to standard undersize, prompt delivery. Guaranteed as new. Washington Iron Works, Inc., P. O. Box 28, Sherman, Texas.

EQUIPMENT WANTED

BUCYRUS ERIE Spudders, 24L to 48L less tools, any condition; give price, age, condition and location first letter. Box M-211, The Oil and Gas Journal, Tulsa, Oklahoma.

SLIM HOLE diamond core barrel. Advise description, location and price, Joel C. Kiester, 406 S. 8th, Duncan, Oklahoma.

BYRON JACKSON or Web Wilson 300-350T Casing Hook, with or without automatic positioner. Must be in good workable and dependable condition. Box M-209, The Oil and Gas Journal, Tulsa, Oklahoma.

13⅜" BJ automatic casing spider w/slips 10¾" BJ slip type side door elevator w/slips Advise price and location. Box M-192, The Oil and Gas Journal, Tulsa, Oklahoma.

CAPITAL WANTED

DRILLING CONTRACTOR has 26 acres Eastern Kansas to drill with Bartlesville Sand production on three sides 699 ft. deep. Needs financial help to drill well on a cost basis. Reply: Box M-193, The Oil and Gas Journal, Tulsa Oklahoma.

HELP WANTED

PETROLEUM ENGINEER with refinery process experience wanted for permanent position with aggressive, independent oil company. Located in Southern California, 20 minutes from heart of Los Angeles. Salary to start $700.00 per month and up, depending on qualifications. All replies confidential. Powerine Oil Co., 12354 East Lakeland Road, Santa Fe Springs, Calif.

VICE-PRESIDENT—OPERATIONS

Wanted, to manage well-established small but growing Eastern corporation. Manufacturer of specially-engineered gas and liquid flowmeters, used mainly in the oil, gas and chemical industries.

A man of general management caliber is needed, well known in oil or gas circles, whose background is principally operational and technical, who can set company goals, manage sales, manufacturing and engineering, and run the business.

Liberal salary—profit sharing—options.

Reply in complete confidence to our management counsel:

WESTON RICHARDSON & ASSOCIATES
FIFTY EAST FORTY FIRST STREET
NEW YORK 17, N. Y.

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Independent Exploration and Producing Company Operating in Rocky Mountain Area.

REQUIREMENTS: Age 25-35, Minimum three years Experience in Reservoir Engineering, Including Reserve Evaluations of Producing Oil and Gas Properties.

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Applicants submit Details of Education, Experience and Salary Desired to:
Box M-208, The Oil and Gas Journal Tulsa, Oklahoma

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For immediate employment. Job requires proof of U. S. citizenship, 3 to 5 years HCC or TCC experience at responsible level. No helpers or trainees desired. These are SUPERVISORY jobs ONLY and salaries are commensurate.

If interested and qualified, write:

COMMONWEALTH OIL REFINING COMPANY, INC.
P. O. Box 1406, Ponce, Puerto Rico

HELP WANTED

COMBINATION WIRE, line operation production Engineer for Mexico. Contact G. Prince, 26th Viena, Mexico City.

SALES ENGINEERS

Johnston Testers, Inc., has openings in Dallas, Hobbs, Snyder, Houston, Oklahoma City, Wichita, New Orleans, Shreveport, Billings, Rock Springs, Los Angeles and Ventura for Sales Engineers. Graduate engineers with minimum of two year's oil field sales experience required. Previous experience in drilling, production and service work helpful. Age 25 to 30.

For personal interview, send complete resume listing experience, education and salary requirements to:

Personnel Director
JOHNSTON TESTERS, INC.
P. O. BOX 98 HOUSTON 1, TEXAS

RESERVOIR ENGINEER

Staff position with Iranian Oil Exploration & Producing Company in Iran.

Background must include degree and 8-10 years Petroleum Engineering experience, the last 5 of which should have been in a specialized Reservoir Engineering function.

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B.S. or M.S. Chemical Engineer with three to five years experience in General Refinery Process Design, preferably with emphasis on TCC or HCC catalytic cracking, sulfuric acid alkylation, catalytic reforming, vapor recovery systems.

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M. D. Daeschner
Assistant Refinery Manager
COMMONWEALTH
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Ponce, Puerto Rico

HELP WANTED

OIL JOB DIRECTORY, foreign and domestic, showing where to apply for jobs. $5.00 cash OIML Co., Box 2603, Tulsa, Oklahoma.

SITUATIONS WANTED

PETROLEUM ENGINEER, 18 years of experience covering all aspects of oil production, but particularly property appraisal and field operation. Desires position with active independent. Comprehensive background should be especially useful where small staff or one man is needed to evaluate deals, do engineering and supervise production. Box M-195, The Oil and Gas Journal, Tulsa, Oklahoma.

WILL CONSIDER any reasonable offer in drilling, producing, management, sales. Petroleum Engineer with 15 years diversified experience with major. Box M-202, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER—18 years diversified refinery experience desires change. Will consider work in process design, operations, or computers. Box M-203, The Oil and Gas Journal, Tulsa, Oklahoma.

BUSINESS SERVICE

DELAWARE CORPORATIONS formed and serviced. American Guaranty & Trust Company, P. O. Box 487, Wilmington, Delaware

LEASE AND DRILLING BLOCKS

HAVE THOUSANDS of acres in Ohio and W. Va. close to Big Play, to farm out. We have a very competant Land Department Will take leases on your lease form. David W. Law, 716 Union Trust Building, Parkersburg, W. Va. Phone: HU 5-6446.

WORKING INTEREST for sale, 25 acre offset to production. 750 ft. Bartlesville sand. Well drilling, water flood ¼ mile to lease. Box M-196, The Oil and Gas Journal, Tulsa, Oklahoma.

WE FILE YOUR application for 10 year oil-gas lease for 640 or 2,500 acres. Federal lands in Utah, Wyoming, Colorado, New Mexico. John L. Donahue, 430 16th, Denver 2, Colorado.

THERMAL-AIR Secondary Oil Recovery Program. Shallow SE Kansas Oil Sands. Inquire: Box 119, McCune, Kans.

WATER FLOOD POTENTIAL. Two seperate deals both with more than 500 acres proven with old wells drilled several years ago many with casing inhole a few pumping, production practically none at present time, in area where water floods are successful. Buy now for this or next year tax purposes. Each for less than $50.00. C. V. Porter, Box 868, Bowling Green, Ky.

OIL LEASE CRANE County, Texas: Available S/239 acres, Section 18, Block B-28, PSL, two miles from new gas discovery Section 23, Blk. 4, H&TC, Hill & Meeker well. Quick action, address landowner: Jefferson G. Smith, 715 Littlefield Building, Austin 15, Texas.

RECREATION

HUNTERS, FISHERMEN wanting information hunting fishing areas contact: Hunters Exchange, 1025 East Washington Street, Brownsville, Texas. Total annual cost, ten dollars.

BUSINESS OPPORTUNITIES

FINANCIAL—Investment Banking Houses and Underwriters reached. Confidential. You can send the details of your proposition diriet or thru your attorney to Consultant 817—51st Street, Brooklyn, N. Y.

160 ACRE GOLD mining claims, New Mexico, Arizona, 25 cents acre if filed now. Prospecting Service, Box 431, Weleetka, Oklahoma.

PRODUCTION WANTED

Desire to acquire some oil and/or gas producing acreage; also substantial adjoining potential acreage for drilling.

BOX M-207
THE OIL AND GAS JOURNAL
TULSA, OKLAHOMA

LEGAL

CALIFORNIA INDIAN LANDS, FOR OIL & GAS LEASE. Two tracts of land in Colusa County, California, totaling approximately 268 acres, are being advertised for oil and gas lease sale. The property is the trust land of the Colusa Indian Community, and full information may be obtained from the BUREAU OF INDIAN AFFAIRS, P. O. BOX 749, SACRAMENTO 4, CALIFORNIA, Phone: IVanhoe 3-6441.

LEGAL

SALE OF OIL AND GAS MINING LEASES, TRIBAL AND ALLOTTED INDIAN LANDS, DEPARTMENT OF THE INTERIOR BUREAU OF INDIAN AFFAIRS, Fort Peck Indian Agency, Poplar, Montana. Sealed bids will be received until 10:00 A.M. Mountain Standard Time, January 17, 1961, and opened at that time at the Fort Peck Indian Agency, Poplar, Montana, for the leasing of 73 tracts of Tribal land comprising 10,219.25 acres and 125 tracts of individually owned trust or restricted Indian lands comprising 29,922.17 acres located in Roosevelt County, Montana for oil and gas mining purposes. Details of the lease offering and how and where to file bids may be obtained by addressing the inquiry to the Superintendent, Fort Peck Indian Agency, Poplar, Montana, or telephone Poplar, PO 8-3441.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Denver, Colorado. Notice is hereby given that 325.16 acres of land in two tracts within the known structure of the Dove Creek field, Montezuma County, Colorado will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 2 p.m., M.S.T., February 15, 1961, when bids will be opened. Details of the lease offering, how and where to submit bids, and forms for bidding, may be obtained from Dale R. Andrus, Land Office Manager, P. O. Box 1018, Denver 1, Colorado.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Santa Fe, New Mexico. Notice is hereby given that approximately 5,567.35 acres of land in twenty-seven parcels within the known geologic structure of certain fields in Eddy, Chaves, Lea, Rio Arriba, Sandoval and San Juan Counties, New Mexico, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 2:00 p.m., MST, January 17, 1961, when bids will be opened. Details of the lease offering, how and where to submit bids, may be obtained from the Bureau's Land Office at Santa Fe, New Mexico. Douglas E. Henriques, Manager.

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Drilling continues brisk in Oklahoma

(Continued from page 225)

BOTH wildcatting and field-development drilling is intense in Oklahoma as the year draws to an end.

In Okfuskee County. Olin Oil & Gas Co. completed 2 Harjo in C SE NW 15-11n-10e in Northwest Clearview field. The well flowed 678 bbl. per day through ¾-in. choke from perforations in the Gilcrease sand at 2,989-96 ft.

In McClain County. Continental Oil Co. completed 1 Perkins in C S½ NW SE 36-9n-4w to add a second Tulip Creek Ordovician well on the McClain County side of Southeast Newcastle field in Central Oklahoma.

The well flowed 168 bbl. of oil per day through perforations at 10,344-46 ft. Gas-oil ratio is 2,240:1. The first Tulip Creek well was completed by Gulf.

In Grady County. Texaco Inc. 1 Slief-Williams in C NE SE 26-5n-7w, an extension discovery at Southeast Harness field, flowed 262 bbl. of 40.4°-gravity oil in 13 hours through 22/64-in. choke from Melton sand at 9,622-48 ft. This moves the field north.

In Garvin County. Cities Service Oil Co. 1 Adams in C NW SE 3-4n-4w, Lindsay area, flowed 90 bbl. of oil per hour during tests at 10,775-10,860 ft. Drilling continues.

In Kingfisher County. Carter Division of Humble Oil & Refining Co. completed 1 Yeoman in C SW NW 24-18n-7w to add Manning well to the southeast side of North Dover field. The well flowed 182 bbl. of 36.8°-gravity oil in 8 hours through 20/64-in. choke from perforations at 6,970-92 and 6,999-7,028 ft. Daily rate was 546 bbl., natural.

In Latimer County. Ambassador Oil Corp. found deep Spiro Pennsylvanian sand production at 1 Williams southwest of Wilburton in C NW 23-5n-18e. The well flowed 5,403 M.c.f.d. through ¾-in. choke from perforations at 8,811-31 ft.

In Ellis County. Pan American Petroleum Corp. 1 Corless unit, C NE SW 3-24n-25w, opened Southwest May field in the north part of the county. The well flowed 3,050 M.c.f.d. from Morrow sand at 7,601 ft. to 7,649 ft.

In McClain County. Cities Service Oil Co. completed a triple-pay well at 1 Jones-K in C SW SW 32-5n-4w, East Bradley field.

The well flowed 16 bbl. in 6 hours from Hart sand at 8,454-78 ft., 258 bbl. in 15 hours from first, second, and third Bromide Ordovician sands at 11,592 to 11,930 ft., and 124 bbl. per day from the Hunton Siluro-Devonian at 10,655-85 ft.

In Harper County. Shell Oil Co. completed 1 Booth in C NE SW 20-28n-24w flowing 8,800 M.c.f.d. and 5 bbl. condensate per million on multipoint open flow test. Production at the Chester Mississippian lime well in Northwest Doby Springs field is from perforations between 6,198 and 6,308 ft.

In Pottawatomie County. Fain-Porter Drilling Co. dually completed 1 Elbert Neal in E½ SE SE 15-6n-2e, Northwest Wanette field, flowing 15 bbl. per hour through ½-in. choke from Viola Ordovician at 5,004-32 ft. The lower Viola zone at 5,126-36 ft. flowed 16 bbl. per hour through open choke.

In Cimarron County. Texaco completed 1 McGarrough in C NW SE 26-2n-9eCM on the north side of Griggs field. The well flowed 2,361 M.c.f.d. on four-point test from perforations at 3,296-3,304, 3,345-50 and 3,406-12 ft.

In Cleveland County. Petroleum, Inc., completed 1 Juricek-B in C SE NE 18-10n-2w, extending Northeast Moore field. The well flowed 23 bbl. of oil per hour from Hunton at 7,486-7,548 ft. Flow was through 20/64-in. choke. Testing continues in the Bartlesville sand now.

In Grant County. Sunray Mid-Continent Oil Co. completed 1 Connery in C NE SE 5-27n-7w, adding Red Fork Pennsylvanian sand production to Wakita field. The well flowed 173 bbl. of oil in 8 hours through 17/64-in. choke from perforations at 4,992-5,000 ft.

In Dewey County. Nichols Drilling Co. has contract to drill a wildcat for Humble 1 Barnes in C NW SE 34-18n-19w, Lenora area. The well is a 9,500-ft. Oswego test. Location is 3½ miles northwest of Humble 1 Spangler in C SW NE 13-17n-19w, discovery of Northwest Webb field, a Tonkawa Pennsylvanian producer. It flowed 48 bbl. per day on discovery test.

In Pittsburg County. Carter 1 Moran in SE SE NW 22-5n-12e, 2 miles west of South Pine Hollow field, flowed 1,790 M.c.f.d. on 9-hour test at 3,240-78 ft. This is the third for Carter in the area. The second pool was in 17-5n-13e, and South Pine Hollow was the first. All produce from Hartshorne sand, Pennsylvanian in age.

Colorado and Utah lead action at Four Corners-Intermontane

ACTIVITY in the Four Corners-Intermontane area of the Rockies included events in Colorado and Utah.

An offset to the only Shinarump producer in Pinnacle field, Routt County, Colorado, pumped 206 bbl. of oil in 17 hours from that zone. A 6,500-ft. Mesaverde Cretaceous test is due for the area west of Willow Creek field in Rio Blanco County, Colorado. Pure Oil Co.'s important Island Mesa wildcat in the Paradox basin, between Lisbon and Southeast Lisbon is drilling in the Devonian. A second Egnar unit wildcat is due by Belco Petroleum Co. in San Miguel County, Colorado. This will go to 9,500 ft. in McCracken Devonian.

A drill-stem test of the Paradox salt got 120 ft. of condensate at Humble Oil & Refining Co.'s Bridger Jack unit wildcat in San Juan County, Utah. A well 1½ miles southeast of Gothic Mesa in the Aneth area flowed 63 bbl. of oil and 56 bbl. acid water in 3½ hours on 2-in. choke. Production is from Desert Creek Pennsylvanian. Tennessee Gas & Oil Co. will drill a Pennsylvanian wildcat northwest of Bluff Bench in San Juan County, Utah.

Southeastern Rockies. The confirmation well to Blake field in Banner County, Denver basin, Nebraska, pumped 125 bbl. of oil daily. Falcon-Seaboard Drilling Co. shut in a Morrill County "J" sand discovery after pumping 14 bbl. per hour. Ambassador Oil Corp.'s "D" sand discovery east of Jackson field in Morgan County, Denver basin, Colorado, flowed 149 bbl. of oil and 1,118 M.c.f.d. on small choke. An eastern Colorado workover well 1 mile northeast of Ashley field flowed 406 bbl. of oil in 19 hours through choke from "D" sand. The flow then died and pump is going in. In Dundy County, southwestern Nebraska, Sunray completed the confirmation discovery to newly

opened Pierce Lake field. Pump got 14 bbl. of oil daily from Lansing-Kansas City Pennsylvanian.

In Wyoming. Several new wildcats were reported in the Powder River basin. Pennsylvanian tests will be drilled by Mobil and Trigood in SW SE 16-49n-69w, Campbell County, and NW NE 4-51n-68w, Crook County.

Sunray has tested an indicated Lance Upper Cretaceous gasser on the Defender Reservoir unit in Wind River basin. Sohio Petroleum Co. will drill a Mesaverde wildcat between Table Rock and Southwest Table Rock in Sweetwater County, Green River basin. Substantial gas flows from Dakota Cretaceous were logged at a new discovery south of Church Buttes and about 1 mile north of an apparent Dakota gas strike completed a few months ago.

St. Helens Petroleum Co. completed a flowing Almond Cretaceous Mesaverde oil well just west of Table Rock unit in Sweetwater County. The 1-26 Government in SE SW 26-19n-98w flowed 240 bbl. of oil and 240 M.c.f.d. from perforations at 6,428 to 6,559 ft. This is a northeast extension discovery to the 1-34 Government in N½ NE 34-19n-98w. That 1959 well flowed only 52 bbl. of oil and 1 M.M.c.f.d. from Almond at 6,585 to 6,684 ft. Nearest Almond gas on Table Rock unit is about 1 mile east and south of the new find.

In Williston. Several new Devonian wildcats are planned in the Tule Creek area of Roosevelt County in northeastern Montana as a result of the continuing rumors of a flowing well near the discovery. In North Dakota, a 1½-mile southeast stepout was completed at South Westhope field in Bottineau County. It flowed 285 bbl. of oil daily from Spearfish, a Triassic pay. Texaco has a new-pay discovery in Devonian at Charlson field on the Nesson anticline.

Oklahoma Panhandle well is good Morrow discovery

A Beaver County wildcat in the Oklahoma Panhandle is a Morrow Pennsylvanian gas discovery. Harper Oil Co. and James F. Smith 1 Haynes flowed 17 M.M.c.f.d. from Morrow sand perforations at 6,640-42 and 6,650-56 ft. through ¾-in choke in 17 hours. Location is in C NW 18-4n-23eCM. Location is 2½ miles southwest of Mocane-Laverne gas field and 5 miles west of Beaver. Production tests are set at Russell Maguire 1-12 Blakemore in 12-4n-22eCM, northwest offset to the new discovery.

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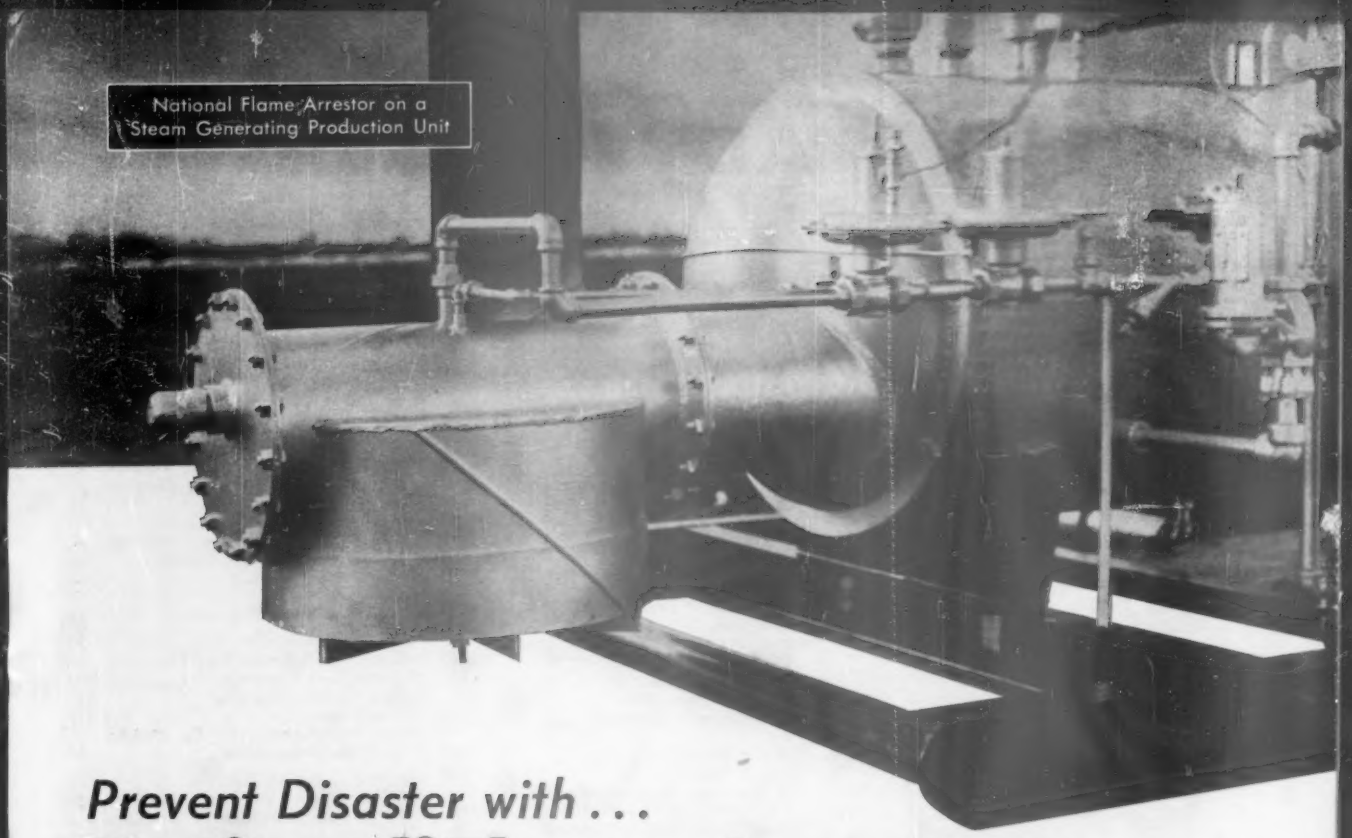

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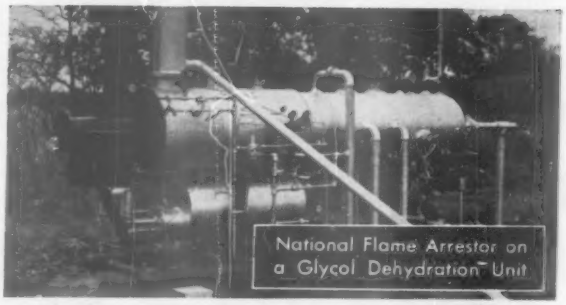

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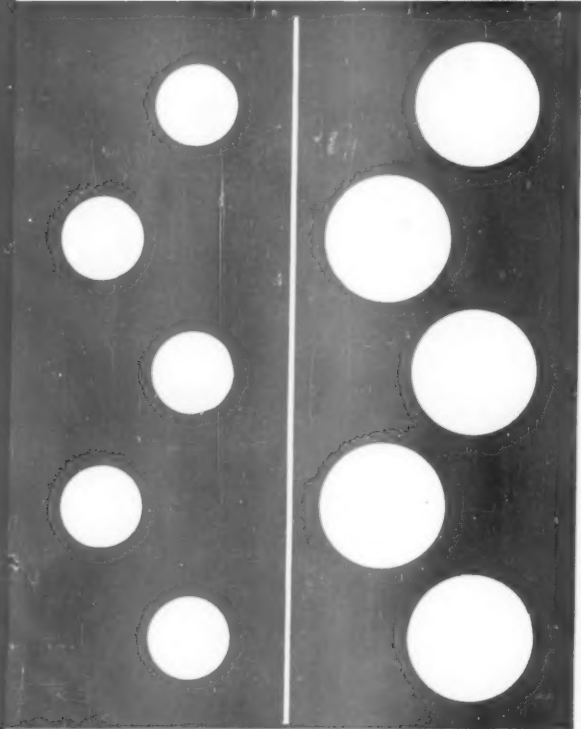

Comparison of area of standard perforations (above, left) and 780 Super E perforations (above, right).

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